

# MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXV.

Published every Thursday at  
418-19 Perry-Payne Bldg., by  
the Marine Review Pub. Co.

CLEVELAND, O., JAN. 30, 1902.

Subscription \$3.00 a year.  
Foreign \$4.50 a year.  
Single Copy 10 cents.

No. 5

## SHIP BUILDING AT PHILADELPHIA AND VICINITY.

Philadelphia, Jan. 29.—The new freight steamship Chester was launched last Saturday from Roach's Ship Yard, Chester, Pa. The vessel is building for the Chester Shipping Co. and the sponsor was Dorothy W. Sproul, the little daughter of State Senator William C. Sproul, who is well known in ship building circles. The launch was of unusual interest to shipping men in this locality and was attended by a large delegation from this port. Dimensions of the Chester are: Length, molded, 140 ft.; length over all, 151 ft. 9 in.; beam, molded, 27 ft.; width over guard rails, 28 ft. 8 in.; depth, molded, 10 ft. 6 in.; depth of hold, 10 ft.; rig, one steel mast, with cargo derrick; engines, compound, jet condensing, 36 and 26 in. diameter of cylinders with 18 in. stroke; boiler, steel, 11 ft. 6 in. diameter by 13 ft. long; two furnaces, 48 in. in diameter; working pressure, 110 lbs.; propeller, cast steel, 8 ft. 6 in. diameter, 12 ft. pitch; speed, 15 miles per hour.

The next launch in these waters, and by far the most important, will be that of the big International Navigation Co.'s liner Kroonland, set for Saturday, Feb. 8. She is a sister ship of the Finland, and both have been building side by side at Cramps Ship Yard for the past two years. They will be the largest vessels ever built on the Delaware and probably the finest examples of the ship builders' art yet to emanate from an American yard. Clement A. Griscom, president of the International Navigation Co., said that the vessels are specially constructed to meet the wishes of that portion of the traveling public to whom a day more or less is not a matter of supreme importance on an ocean voyage. Except in point of speed, the Kroonland and Finland will be the equal of any passenger liner afloat. The principal dimensions of these vessels are: Length between perpendiculars, 560 ft.; breadth, 60 ft.; depth, 42 ft.; gross tonnage, about 12,000. They will run on the Red Star line between New York and Antwerp in conjunction with the steamships Vaderland and Zeeland, built at the yard of John Brown & Co., Ltd., of Clydebank, Glasgow.

The Neafe & Levy Ship & Engine Building Co. is making active preparations for the maiden dip of the sheathed protected cruiser Denver, which is now about 50 per cent. completed. It is desired to put down the keel of the sheathed protected cruiser St. Louis on the launching slip now occupied by the Denver, and owing to the progress made on the work in connection with the St. Louis in the shops the company is now anxious to begin the real operations of building the vessel. Naval Constructor J. H. Hanscom and his assistant, Mr. Robinson, will remain in charge of the government work, both at this yard and at Cramps'. The recent rumor in local ship building circles regarding the transfer of both officials is pronounced without foundation.

It may be of interest to mention that there is an unprecedented demand for skilled labor in connection with the work under way in Delaware river ship yards. The trades particularly in demand are those of marine erecting hands, boiler makers for heavy work and machine hands. It is difficult to explain the sudden and wonderful revival of the machinist business after so long a period of stagnation. The same situation is reflected on the railroads centering here and is illustrated by the fact that machinists are paid \$2.40 per day where four or five years ago their pay was \$2.00. The Cramp yard is paying up to 30 cents an hour for machine hands and even better figures for those on the boats installing machinery.

## SCHWAB ON THE FUTURE.

Mr. Charles M. Schwab, president of the United States Steel Corporation, was in Berlin during the fore part of the present week. While there he received a number of bankers and manufacturers who were quite anxious to meet the managing head of such vast capital. It is understood that Mr. Schwab's observations in France, Italy and Austria have confirmed his belief that their external markets will inevitably become the United States markets and that all they can do in their trade contests is to preserve their domestic markets, through tariffs, the Americans appropriating the rest of the world. Whether Germany puts up her tariff or not it does not count for much in Schwab's general survey of the international situation.

"Naturally," he said, "it is to America's interest that the German tariff should not be increased, but I do not think we can expect Germany not to increase her tariff, so that it will really protect her home market from our competition. If Germany does not raise the tariff, it means that our highly finished goods, as well as our coarser products, will take this market. American exporters quite expect Germany's tariff to go up. It is not in Germany, France or Austria that we can sell largely, but in England, Russia, Turkey and China, and all the free markets, where Germany and England find outlets. Time is the only element, and it will not be a very long time, either, until they are all ours."

## A TORPEDO BOAT STATION.

A dispatch from Norfolk, Va., says that the report current during the summer months that the St. Helena property, or a portion of it, would be made a torpedo boat station, seems about to be verified as correct. Contracts have been made with Clement Walker of Norfolk for the dredging of seven slips and the construction of the necessary piers. Six of the slips, or docks, are to be each 296 ft. in length, and one will have a length of 4,000 ft. They will all be dredged to afford a depth of 15 ft. at low water. The piers which separate these docks will be about 24 ft. in width. The work will cost \$109,000, and its purpose is to afford berths for the torpedo boats of the navy. Comparatively speaking, these boats are delicate affairs, and require such care and maintenance that it will be necessary to take them from the docks about once a month. As a further means of protecting them, it is the purpose of the department of yards and docks to build sheds, or roofs, over these docks as soon as the necessary appropriation can be secured.

## DANISH WEST INDIES CEDED.

The treaty ceding the Danish West Indies to the United States has been signed and transmitted to the senate. This consummation of protracted negotiations which will put the United States in possession of the strategic key of the Caribbean and relieve Denmark of a steady drain on her resources, came unexpectedly after hope had almost been abandoned. The convention follows closely the terms of the treaty of Paris of 1898 between the United States and Spain as regards the status of the inhabitants of the islands, their property and citizenship and it is understood that the compensation to Denmark amounts to \$4,500,000. It is regarded as a strong point by the framers of the treaty that the people of the islands are to have a voice in the question of cession. The treaty itself contains no reference to a plebiscite, but the Danish government has given notice that before it ratifies the treaty it will submit the question of cession to the people of the islands. Not much objection is expected from these people, as the treaty is so framed that they are not called on to surrender their Danish allegiance and they may remain Danes in fact and in name while enjoying whatever advantages in a commercial way may result from a transfer of the islands to the United States. The plebiscite will not be controlled in any sense by the United States.

The Danish West Indies comprise three islands, St. Thomas, St. John and St. Croix, all within sight of each other. They cover about 127 square miles, and the population is estimated at about 30,000. Denmark has been the possessor of the islands since 1671, but they have never been a great source of revenue, and for many years it has cost Denmark much money in excess of the revenue to maintain them. Charlotte Amalie is the largest place on the island of St. Thomas. There are comparatively few whites on the islands, not more than 15 per cent. of the population. The blacks are of a superior class and have the same rights and privileges as the whites. There is no such thing as a color line there. Education is compulsory, and all the children, white and black, go to school between the ages of seven and thirteen. In the churches there is also an absence of all distinction as to color, and there is no line drawn in business. Inter-marriage between natives and whites is nothing unusual, and clergymen of the various denominations never refuse to perform the marriage ceremony between white and black men and women. There seems to be a misunderstanding as to the language used by the people in the Danish West Indies. The fact is that everybody speaks English, and although the official language is Danish, English is used in the schools as well as in the court of justice.

St. Thomas has little agricultural importance. A few onions and other vegetables are raised there, but not enough to supply the 10,000 inhabitants, and nearly everything that is used at the table is sent from this country. Charlotte Amalie has a fine harbor, large coal wharves and a dry dock, and among its larger buildings are the government house and a hotel. The stores and shops, as well as the houses of the inhabitants, are nearly all one-story buildings. The old structures are built of stone, but the modern houses are of wood, and all are of the old Spanish style. The roofs are tiled and flat, and so arranged that they shed the rain into cisterns, where it is kept for drinking purposes, there being no other water available.

On the island of St. Croix, Fredericksted and Christiansted are the chief towns. These places have a population of about 1,000 each. They have stores and shops like those of St. Thomas, and the population is made up of the same elements. There are Episcopal, Moravian, Catholic, Dutch Reformed and Methodist churches and a synagogue, and there are two Masonic lodges in the island, one French and one English. In each of these there are as many black as white members. One of the deacons in the Dutch Reformed Church is a fullblood negro.

Denmark has maintained an army on the islands of about 250 men. These are volunteers recruited from the veteran corps in the home country, and sent to the islands for a term of six years.

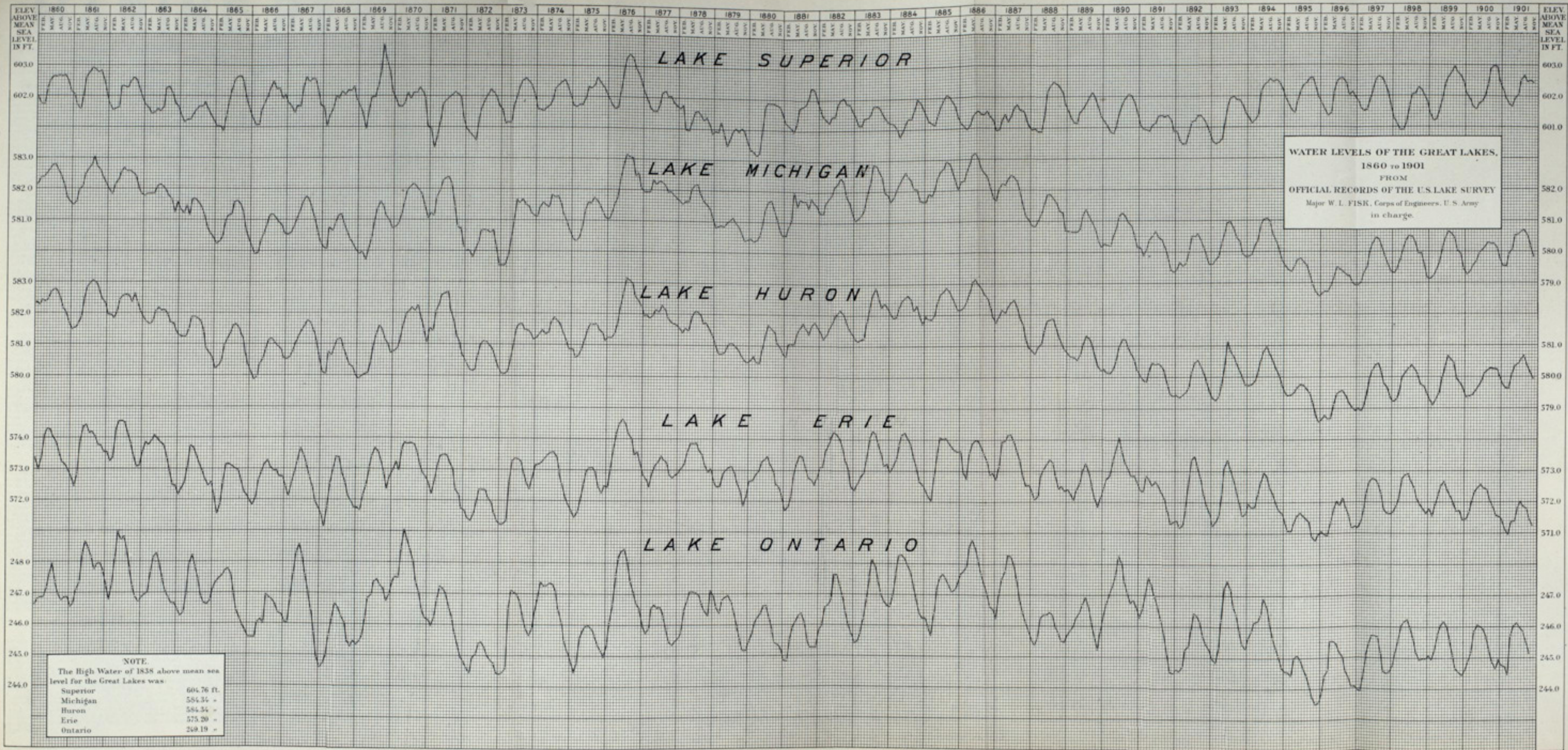
There are thirty-two sugar estates on the island of St. Croix, the product of which goes to one concern in New York. But in order to protect growers who are not in this combination the Danish government established sugar stations, where growers bring their cane for sale. It is ground in the mills, which were built and operated by the Danish government, and the producer receives pay based on the New York prices.

A sail of half an hour from the east end of St. Thomas takes one to St. John, which has a population of about seven hundred. There is much grazing land on this island, and with a small investment profitable stock farms might be established there. The inhabitants of this island are nearly all blacks. The chief judge of the island fills several other important offices. He is the chief of police, the postmaster, the head of the truant school which is situated on the island, and wharf master and custom house officer. The police department over which he presides has two members.

In consequence of the success of the turbine steamer King Edward, another and larger vessel of that type has been ordered. She will have a speed of 21 knots against the King Edward's 20½. The Parsons Steam Turbine Co. will supply the engines. The company is also making the machinery for a new turbine destroyer of the same speed as the Viper, but designed to consume less coal. The company is also making turbine machinery for three large yachts for Mr. McCalmont, Sir Christopher Furness and Mr. A. L. Barber of New York.

The annual meeting of the Morse Iron Works & Dry Dock Co., Brooklyn, N. Y., was recently held and the following officers were re-elected for the ensuing year: E. P. Morse, president, treasurer and general manager; C. G. Street, vice-president and secretary. The directors are: C. G. Street, W. L. Chapman, E. P. Morse, J. J. Detwiller and S. F. Hayward.







### MAYOR LOW ON THE ERIE CANAL.

Mayor Seth Low of New York, in responding to the toast "The City of New York" at a banquet at the Waldorf-Astoria recently, made the following remarks on the subject of improvement of the Erie canal:

"We of New York, conscious of the greatness of our city, are sometimes in danger of thinking that the city of New York not only is the center of the universe, but all there is of it. It is well for us, occasionally, to remind ourselves that the city of New York, after all, is only one of the great cities, though indeed the greatest, of the United States. It may not be known to all here that a few years before the American revolution an item appeared in a newspaper of Newport, R. I., calling upon the citizens of that seaport to bestir themselves or the city of New York would surpass Newport in point of commerce. It may not be known to all of you that in the early part of the nineteenth century when the three brothers arrived in America who formed the well-known banking house of Brown Brothers & Co., the eldest brother went to Philadelphia, because that was the most important city in that day; the second brother went to Baltimore, and the third and youngest brother was assigned to the city of New York, because at that time this was the least important city.

"What was it that lifted New York within half a century from that position of comparative unimportance into the easy primacy among the American cities which it has held ever since? Everybody will agree with me that it was the construction of the Erie canal. We are face to face today with the question as to what shall be done with this old canal, which in its original condition and under the conditions of that day gave to New York its preeminence among the cities of America. I remember to have heard an anecdote told of the late Com. Vanderbilt that when he had obtained the control of the various small railroads which make up the present New York Central & Hudson River system, some one said to him: 'Commodore, now that you have got these railroads, what are you going to do with them?' His reply was: 'I am going to dry up the Erie canal and drive every boat off the Hudson river.' Of course he did not mean that as a literal statement, but what he did mean to express, I take it, was this: his supreme confidence in the possibility of cheap transportation by rail. And his vision has been largely justified.

"I suppose there is really no more troublesome problem connected with public work in the state of New York than really to determine what ought to be done about our canals. It seems to me that we can get some light upon the wise course of action by considering what has been done elsewhere in this regard. France has spent many millions of dollars in the last thirty years in improving her waterways. You may be very sure that a frugal country like France would have done no such thing if the usefulness of the canal was a thing of the past. But the truth is, as I believe, that a modern canal is just as great an improvement on an old-fashioned canal as a modern railroad is an improvement on an old-fashioned railroad. I believe it even to be a fact that in France, where the state owns many of the railroads, a private railroad company, in one instance, has contributed to the cost of the construction of the canal paralleling the road, because it believed that the canal would be an advantage to the road by enabling the road to throw upon the canal the transportation of the cheaper and bulkier freights. If I am right in the inference that I draw from these facts—for I think I am correct in my facts as to France—it would seem to me to follow, inevitably, that it is still the part of wisdom for the old state of New York to improve her Erie canal in the best possible way. I know that it is a question of dispute as to what is the best possible way. I am inclined to say, however, with such light as I now have upon the subject, that it seems to me the part of wisdom—and I think I am justified in saying that it is the interest of the city of New York—to sustain the proposition made by the governor of the state on that subject in his opening message to the legislature. We shall never get anywhere unless we can agree on some plan. The plan proposed by the governor has been reached by him after one year of careful study of the report submitted by the commission appointed by Gov. Roosevelt, and the problem at large with such facilities as the governor of the state can command.

"If there are any people in the city of New York who think that it is not wisdom for our city to support that measure, I hope they will speedily make it known to me, for, unless some convincing reason is presented to me very shortly, I propose to throw whatever influence I have as the mayor of this city in favor of this plan. It is well known that New York has become the Empire state, and the city of New York the metropolis of the country, because of the natural advantages of geography which are ours. It is through the state of New York alone that access can be had to the west over a comparatively level roadway all the way. I do not believe that we shall be wise in abandoning that advantage and trusting to the tender mercy even of our own railroads, which have to make traffic arrangements with other railroads that have no interest in the state of New York. I believe it to be in every sense the interest of the state and the interest of the city to make a model canal out of our old Erie canal that shall do for us in the days to come, after its measure, precisely what the canal did when it was first built, help us to maintain the supremacy that is now ours. For it must never be forgotten that New York is what it is, not primarily because of the virtue of its own citizens only, but, primarily, because it is the culminating expression of the wealth and power and good citizenship of the United States."

### OFFICIAL FIGURES REGARDING PIG IRON PRODUCTION.

A report just issued by the American Iron & Steel Association gives the total production of pig iron in 1901 as 15,878,354 gross tons, against 13,789,242 tons in 1900, 13,620,703 tons in 1899, 11,773,934 tons in 1898 and 9,652,680 tons in 1897. The whole number of furnaces in blast on Dec. 31, 1901, was 266, against 232 on Dec. 31, 1900, and 259 on June 30, 1901.

Unsold stocks Dec. 31, 1901, amounted to only 70,647 tons, compared with 372,560 tons on June 30, 1901, 442,370 tons on Dec. 31, 1900, and 338,053 tons on June 30, 1900.

The production according to fuel in 1901 was: Bituminous, 13,782,386 tons; anthracite, 1,712,527; charcoal, 360,147; charcoal and coke, 23,294; total, 15,878,354.

The production of Bessemer pig iron in 1901 was 9,596,793 tons, against 7,943,452 tons in 1900. The production of basic pig iron in 1901 was 1,448,850 tons, against 1,072,376 tons in 1900. The production of spiegeleisen and ferro-manganese in 1901 was 291,461 tons, against 255,977 tons in 1900.

### BESSEMER ORE ASSOCIATION.

Referring to resignation of Mr. Leonard C. Hanna of the firm of M. A. Hanna & Co. of Cleveland from the presidency of the Bessemer Ore Association, the Iron Trade Review says:

"For nine years Mr. Hanna has been president of the association, and in all the counsels and plans of the ore men has led with rare ability and discrimination. The association was formed at a time when demoralization was dominant in the Lake Superior ore trade. It was organized in the face of many predictions of failure and against difficulties that in other hands might easily have been insurmountable. With perhaps the single exception of the prices established in 1896, the decisions of the association have commended themselves to the trade as wise and conservative, and the organization has been a balance wheel to the northern iron trade to a far greater extent than many appreciate. Its statistical work and its development of a scientific method for representing to a nicety in a price schedule the value of any ore as compared with all other ores—these alone have far more than justified its existence. Furnacemen have given ready testimony to the benefit the association has been to their industry in maintaining uniformity of prices through the year and in eliminating the speculative element that was formerly inseparable from ore contracts entered into oftentimes fifteen and sixteen months in advance of their termination. While Mr. Hanna has expressed a desire several times in the past few years to be relieved from the responsibilities of the presidency, he has been persuaded to retain it. This year he again urged his request, and it was acceded to. The office has passed to most competent hands, in the election of Wm. G. Mather, president of the Cleveland-Cliffs Iron Co. Mr. Mather's company is the largest merchant producer of old range ore in the Lake Superior region."

### ANNUAL MEETING OF SHIPMASTERS' ASSOCIATION.

The Shipmasters' Association of the great lakes met in Washington last week and held a very interesting session. The association adopted a resolution petitioning the lighthouse board to provide lights for the islands of Lake Superior after the keepers have left. The keepers are usually withdrawn on Dec. 1, while navigation extends for sometime hereafter and is attended with considerable peril, owing to the absence of lights. The association desires the lighthouse board to equip the towers with Pintsch gas, which will burn an indefinite period without attention after the keepers have left their stations. A similar resolution was adopted by the Lake Carriers' Association at its annual meeting in Detroit.

The association indorsed the house bill calling for one year's steamboat experience before a license can be secured. It was recommended also that a patrol system be devised for the Detroit river. Capt. Davis of the revenue cutter service has drawn up a bill to this effect.

Conferences were held with Congressmen Burton, Southard and Minor and several measures were projected, among them being measures condemning center pier bridges in rivers and advising the construction of breakwaters further off shore. The bill to place the revenue cutter service upon the same footing as the navy department in the matter of retiring upon pay was recommended. Death claims amounting to \$12,000 were paid during the year, leaving a balance of \$4,300 in the treasury. There is also a good balance to the credit of the general fund. The following officers were elected: Capt. J. A. Ward, Marine City, president; Capt. E. E. Denville, Toledo, vice-president; Capt. Walter Hamilton, Chicago, second vice-president; Capt. W. A. Collier, Cleveland, treasurer; Capt. E. G. Ashley, Toledo, secretary.

### NEW BRIDGE ACROSS THE ST. LAWRENCE.

According to the Evening Post negotiations have almost been completed in New York and in Canada for the construction of a bridge across the St. Lawrence river at Montreal which is to be one of the largest in its class in the world. The bridge to be constructed is the Royal Albert bridge from Montreal to Longueuil and the Montreal Bridge Co. has entered into a contract with the Atlas Construction Co. to erect it. This latter company was incorporated under the laws of New Jersey on Jan. 25 with \$15,000,000 capital. In taking over this contract the construction company has bought out all the old interests which were held by C. N. Armstrong. The construction company plans to begin work on the bridge as soon as aid, already pledged by the province of Quebec and the city of Montreal, becomes available.

The estimated cost of the bridge, with its terminals, is \$10,000,000. The total length of the bridge is to be 8,800 ft. The main span, a cantilever, which will be the largest of its kind in the continent, will be 1,260 ft. long. The height of the bridge above the water will be 150 ft., and its width 83 ft., divided as follows: A double track railway, 26 ft.; a double track electric railway, 22 ft.; a double highway, 23 ft. and two sidewalks, 12 ft. The weight of steel in the structure will be about 74,000,000 lbs. and there will be 90,000,000 yards of masonry.

The railroads which will be benefited by the new bridge are: The New York Central, Delaware & Hudson, Rutland, Boston & Maine, Rome, Watertown & Ogdensburg, Great Northern of Canada, Canada Atlantic, South Shore, Atlantic & Lake Superior, Great Eastern, St. Chrysotone line, Southern Counties, Montreal Terminal, and the Montreal street railway. The Canadian Pacific might be mentioned, inasmuch as this road is extending its car-building plant and repair shops in the east end of Montreal, adjacent to the proposed terminal of the Royal Albert bridge.

The Falls Hollow Staybolt Co., Cuyahoga Falls, O., has issued a beautiful calendar. The illustration is a reproduction in colors of George Taggart's painting "The Raffle," done by the Osborne Co., New York, which has issued many exquisite calendars this season. Officials of the Falls company report that their business is increasing daily and that it guarantees every bar of its staybolt material, either iron or steel, to meet railway or government specifications and inspection.

The White Star line is not for sale. Mr. J. Bruce Imray, the head of the company, who is now in the country, says: "The White Star line is not for sale. I am satisfied with the dividends which the line is paying and so are all the other stockholders so far as I know. I think it is a good property and intend to hang on to it."



## LOW-WATER REFERENCE PLANES.

A NEW STANDARD HAS BEEN ADOPTED, BASED UPON THE LOWEST KNOWN LEVEL, FOR SOUNDINGS ON THE LAKE SURVEY CHARTS—  
VERY IMPORTANT INNOVATION.

As the narrative below has to do with an important revolution in recording existing depths of water in the navigable channels of the great lakes it might be well to premise it with a brief sketch of the engineer who is projecting it. Maj. W. L. Fisk, now stationed at Detroit, was graduated from the United States Military academy at West Point in 1877. He was



Maj. W. L. Fisk.

stationed at the United States engineer school at Willet's Point, New York harbor, until 1880. He was assistant to Gen. Quincy A. Gillmore in local charge of river and harbor works in Florida until 1882. The principal works which came under his jurisdiction were the beginning of the jetties at the mouth of St. John's river and at the entrance to Cumberland sound. He was assistant to Col. S. M. Mansfield at Galveston, Tex., until 1884, the chief work being the Galveston jetties. During 1885 he acted as secretary of the Missouri river commission at St. Louis. He was assistant professor of civil and military engineering at the United States military academy at West Point until 1887. From that time until 1891 he was stationed at New Orleans in charge of river and harbor works on the coast of Louisiana. He had in charge the construction of the jetties at Sabine Pass, La., and Tex., and also the surveys of South Pass, Mississippi river, upon which depended the payments made to the estate of James B. Eads for maintaining that channel. He was also engineer of the seventh and eighth lighthouse districts. He went to Duluth in 1892 and assumed charge of river and harbor works on Lake Superior. While there he considerably improved the harbors of Duluth, Two Harbors and Marquette. He was stationed at the engineer school, Willet's Point, New York harbor, until 1895, as instructor in electricity and submarine mining. He then went to Portland, Ore., where he remained until 1899. He constructed the locks at the Cascades of the Columbia river, the jetty at the mouth of the river and the jetty at Coos bay; also fortifications at the mouth of Columbia river. He also acted as engineer of the thirteenth lighthouse district comprising Oregon, Washington and Alaska. He was at Portsmouth, N. H., until the end of 1900 in charge of the new defenses of that harbor; and of river and harbor work between Boston and Portland, doing exceedingly important work in the construction of a harbor of refuge at Sandy bay, Cape Ann, Mass. He has been stationed at Detroit since the beginning of 1901 in charge of the United States lake survey, including the preparation and issue of charts and the investigation of lake levels with which the subjoined article has to do.

Maj. W. L. Fisk of Detroit is engaged on one of the most important works in relation to lake commerce in which it is possible to be engaged—that is to devise a system whereby the master of a vessel might instantly calculate the actual depth of water in the harbors and known shoals of the lakes. At present only the relative depth is known, owing to the lake level basis upon which depths are reckoned. Under the present system there may be less water in a harbor, or in any of the connecting channels of the lake, than is indicated on the charts, owing to fluctuations of the lake level. Under the new system there never will be less water than is recorded, because the new charts are to be based upon the lowest known level for a great series of years. Some time ago Major Fisk took the subject up with the authorities at Washington and received authority to formulate the new system. He is now issuing a new series of charts based upon the new standard low-water reference planes.

"The great advantage," said Major Fisk, "of the standard low-water reference planes for soundings on lake survey charts is that in the lakes themselves there will probably always be a little greater depth of water than indicated by the charts. Therefore, when the navigator is working by them and not cognizant of the prevailing stage of water they cannot lead him into trouble."

As shown on the lithographed chart, which is issued as a supplement to this issue of the Review, the elevation of these new standard low-water reference planes, expressed in feet above mean sea level at New York, is:

For all charts pertaining to Lake Superior.....	600 ft.
For all charts pertaining to Lake Michigan.....	578 ft.
For all charts pertaining to Lake Huron.....	578 ft.
For all charts pertaining to Lake Erie.....	570 ft.
For all charts pertaining to Lake Ontario.....	243 ft.

The standard low-water reference planes for the various river charts will be made consistent with those for the lakes which they connect. The lowest monthly mean stage of water in Lake Superior of which there is official record was 600.19 ft. in March, 1880. It is not at all probable, at least not for many years to come, that during the season of navigation the stage of water in this lake will go below 600 ft. A higher elevation could not well be chosen without danger of the charts at some time indicating more water than actually existed. Six hundred feet has therefore been chosen as representing the safest stage for all conditions likely to occur. The lowest monthly mean stage of water in Lakes Michigan and Huron was 578.59 ft. in December, 1895, and the elevation of 578 ft. has been adopted for the standard low-water reference plane for these lakes. The lowest monthly mean stage of water in Lake Erie was 570.79 ft. in November, 1895, and the elevation of 570 ft. has been adopted for the standard low-water reference plane for this lake. The lowest monthly mean stage of water in Lake Ontario was 243.50 ft. in November, 1895, and the elevation of 243 ft. has been adopted for the standard low-water reference plane for this lake.

The soundings on all lake survey charts, issued by the engineer department, will be reduced to this plane as rapidly as the work can be done. Early in the coming summer the charts will be supplemented by a system of automatic gauge indicators for the harbors and rivers of the great lakes. Each gauge will show continuously, in figures large enough to be read with a good glass for a distance of two miles, the additions to be made to the soundings on the corresponding harbor, coast or general survey chart to give the actual depth of water for the stage prevailing at the time. Major Fisk is now engaged upon the design of these indicators, which will all be of a standard pattern.

It will thus be seen that the combination of the charts with the automatic gauge indicators will furnish vessel masters at all times absolutely

reliable information as to the depths of water prevailing at any particular harbor or along any particular river.

Major Fisk says that he is desirous of working on the most cordial terms with those who have interests of any kind bearing upon the charts and will be glad to receive suggestions that will tend to make them more useful, and especially information as to any shoals which may not be on the charts, in order that they may be definitely located and recorded.

In this connection it is interesting to note that, according to a table arranged by Maj. Thomas W. Symons, United States engineer corps, the level of Lake Erie at Buffalo has been falling for the last four years. The fall was gradual until 1900, when it became greater than in preceding years. Among other things he has found that the lowest water in the period of navigation occurs in the spring and fall when the harbor is busiest. The highest water reached during the four years was Nov. 21, 1900, the stage being plus 6.4 ft. and the lowest on Dec. 4, 1898, and March 13, 1901, when minus 4.4 ft. was recorded on both dates, the range of fluctuation being 10.8 ft. The following table gives the monthly mean stages of water for the last four years. The figures show the feet and decimals below the established mean lake level:

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1898 .....	1.37	1.48	1.10	0.50	0.37	0.33	0.55	0.59	0.97	1.14	1.04	0.98
1899 .....	1.10	1.56	1.21	1.15	1.00	0.70	0.66	1.05	1.12	1.31	1.50	1.17
1900 .....	1.55	1.55	1.60	1.02	0.76	0.76	0.85	1.08	1.41	1.33	1.30	
1901 .....	1.53	2.12	2.34	2.05	1.98	1.48	1.25	1.50	1.41	1.59	1.80	1.75
Average 4 years.....	1.39	1.68	1.56	1.18	1.03	0.82	0.79	1.00	1.14	1.36	1.42	1.30

## TO CHECK THE "BOOM" IN IRON AND STEEL.

A STATEMENT FROM THE UNITED STATES STEEL CORPORATION SHOWING A BUSINESS SO PROSPEROUS THAT A LEVER MUST BE PUT UPON PRICES TO WARD OFF THE DANGER OF REACTION.

For two or three weeks past it has been generally understood in iron and steel circles that heads of the United States Steel Corporation would take measures to check the "boom" that is again at hand in this industry; that further advances in prices would be discouraged so as to avoid danger of reaction. An official statement on this score, just issued by the big organization, shows a most prosperous condition of business. It is a statement preliminary to the general report that will be made to stockholders at the annual meeting Feb. 17, and is signed by President Charles H. Schwab and Mr. Elbert H. Gary, chairman of the Board of Directors. Briefly, the statement is as follows:

"The outlook for the year 1902 is very bright. Everything indicates that all of the facilities of each subsidiary company will be taxed to their utmost to supply the demand that is being made. The actual business now booked and of which shipment is being called for faster than it can be supplied amounts to more than half the total combined annual capacity of all the companies. The heavier products, like rails, billets, plates and structural material, are sold up to the productive capacity of the mills until nearly the end of the year. In the more highly finished products the consumption in each case is greater now than at the corresponding period in 1901, which it should be remembered was an abnormally heavy year. The expectation therefore of those closely connected with the manufacture and sale of these highly finished products, is for a time even larger than that of 1901, and up to the limit of production."

Discussing prices, the report said they could have been advanced, but that it was decided to be better policy to refrain from doing so. The reference to prices follows in part: "The demand for products has been so great that prices could easily have been advanced. Indeed, higher prices have been voluntarily offered by customers who were anxious for the immediate execution of orders, but the companies have firmly maintained the position of not advancing prices, believing that the existing prices were sufficient to yield a fair return on capital and maintain the properties in satisfactory physical condition and that the collateral advantages to be gained in the long run by refusing to advance prices would be of substantial and lasting value not only to the companies, but also to the general business interests of the country."

The report asserts that this policy as to prices has not only exerted a reassuring effect upon the trade, but has contributed to the restoration of confidence in the general business situation. Great progress has been made in the general plan to harmonize the work of the many plants, to secure perfect co-operation and to effect economy in manufacture, but the end has not been reached and favorable results may still be accomplished. The departments of ore mining, coal mining, coke manufacture and lake transportation, the report says, have been thoroughly systematized and the managements of manufacturing plants have been brought into closer relationship. Advantage has been taken of the cheapest distribution in the scheme of economies.

The report reviews the larger financial operations of the company, including those of its organization, printed the recently published statement of earnings for the first nine months of the existence of the company and gives a condensed balance sheet for Nov. 30, 1901. This balance sheet shows that on Nov. 30, 1901, the accounts receivable aggregated \$45,269,453, the bills receivable \$2,821,463 and the cash on hand \$55,315,527, a grand total of \$103,406,444. In the list of assets in the balance sheet was a credit of inventories amounting to \$95,603,997 and a subjoined tabulation showed that it included ores on hand valued at \$34,776,053, finished products, \$15,322,636, manufacturing supplies and miscellaneous stores \$12,170,161, and materials, labor and expense locked up in current uncompleted bridge contracts \$9,268,361.

The current liabilities on Nov. 30 were stated at \$50,269,630, and the surplus of the corporation and the subsidiary companies was placed at \$174,344,229. The cost of the properties owned and operated by the several federated companies was given as \$1,437,494,862.

"The business of the companies," says the report, "has been put on practically a cash basis. The losses actually incurred through bad debts have been very small and little if any loss in the collection of accounts and notes receivable is anticipated. About 70 per cent. of the total current monthly accounts due from customers is now being generally collected within thirty days and it is the effort of the several managements to maintain the business on a strictly cash basis."



### OFFICIAL TEST OF ALGIERS FLOATING DRY DOCK.

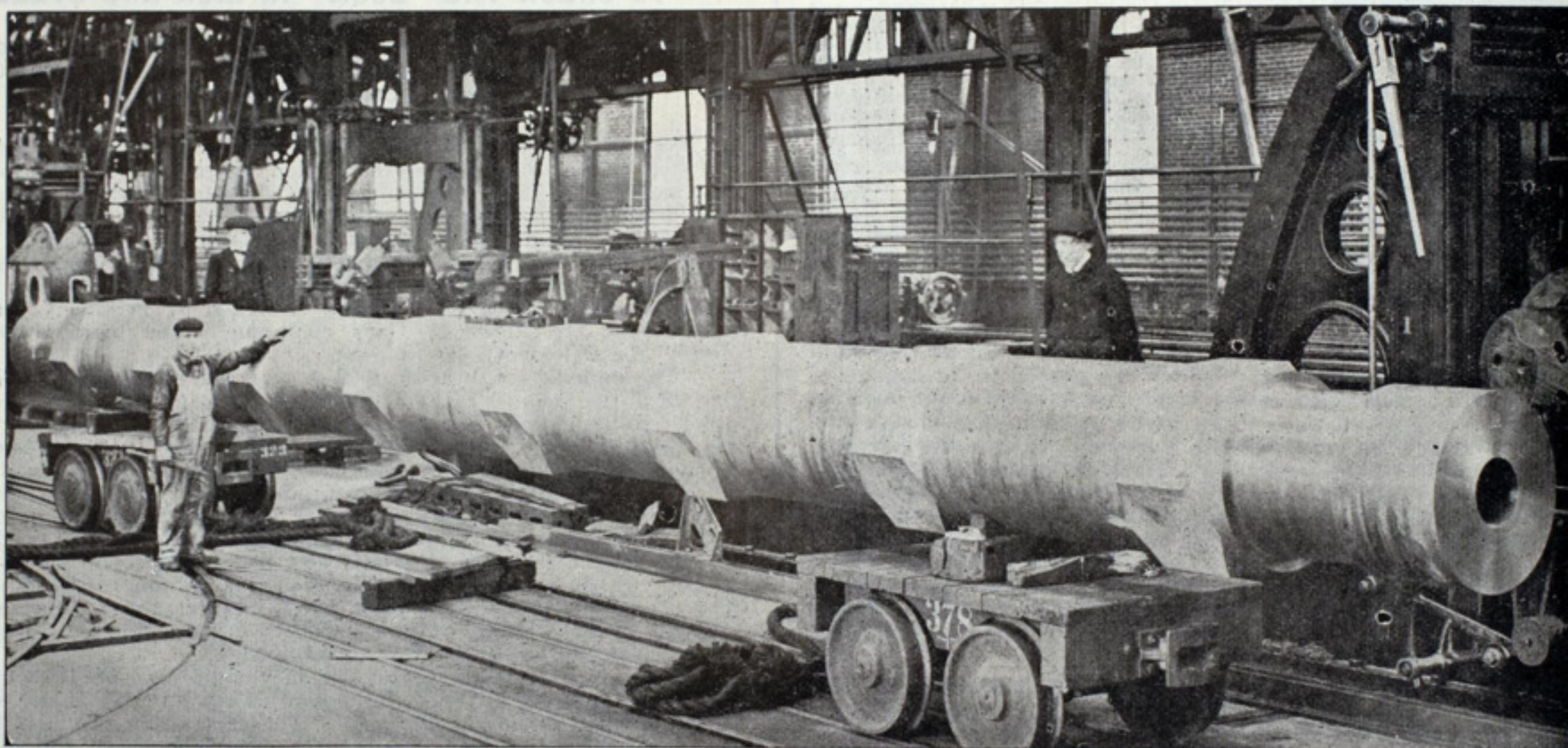
The report of Capt. Converse's board on the test of the floating dry dock at New Orleans, with the docking of the collier *Sterling* and the battleship *Illinois*, has just been made public by Admiral Endicott, chief of the navy bureau of yards and docks. In general the working of the dock was satisfactory to the naval board and it is considered capable of docking a 15,000-ton battleship. The board, however, was disappointed in the depth of the river, but as Admiral Endicott remarked "that's the fault of the Mississippi." The report in its opening paragraph says that it was the intention to obtain a dry dock with all appurtenances for successful operations at all stages of the river in docking a vessel drawing up to 28 ft. of water. Continuing the report says:

"The trials conducted by the board show that it was impossible to obtain the required depth of 28 ft. over the blocks, and at no time during these trials was a greater minimum depth than 22 ft. 3 in. over 48-in. blocks obtained with the river at 3.2 ft., Canal street gauge, and the board is of the opinion that during these trials the contractor has made every effort by dredging and scowling to obtain a greater depth of water, and that it is impracticable to obtain 28 ft. over the blocks of the docks as now located and moored. There are no means of indicating the engine or pumps, so that no economic test of the machinery and boilers could be made, but the work of raising the dock with the battleship *Illinois* was deemed a proper duty test of the effectiveness of this machinery and was considered satisfactory. The docking of both these vessels (*Sterling* and *Illinois*) was satisfactory, and as a measure of precaution in docking the *Illinois* and to provide for undocking in the event of slight fall in the river, it was deemed advisable to reduce the height of the keel blocks from 4 ft.

engines should be covered with some approved non-conducting material to prevent radiation of heat. Racks should be provided for the wrenches and trap for the oil cans. Two special spirit levels should be installed in each valve house to replace the clinometers, which are untrustworthy in their indications. The bed blocks should be redressed and all blocks should be planed to a uniform thickness. Fenders should be provided to protect the altars and chairs to guide sheaves for bilge blocks. Additional side lights should be installed on machinery deck and additional ventilation should be provided for in the machinery compartments.

"The board is of the opinion that all the defects enumerated above, except where otherwise recommended, should be made good before its final acceptance. The separate reports and recommendations made by the technical members of the board and appended hereto are concurred in by the entire board. From the experience gained during the various tests which have been made with the dock itself and in docking the *Sterling* and *Illinois*, the board believes that certain modifications in the dock and additions to the present fittings are necessary for efficiency, and has prepared a list which is appended hereto. The board is of the opinion that the changes enumerated in this list should be made at the expense of the government, as they are not covered by the plans or specifications."

Lieuts. John G. Tawresey and H. G. Gillmor, naval constructors, in their technical report, make this criticism: "The travel of the bilge block is insufficient to allow them to be hauled back enough to clear deep draught vessels. In nearly every case the bed timbers for the bilge blocks come over manholes in the pontoon deck, so that it is impracticable to get access to these compartments without moving these blocks and timbers. This makes it practically impossible to examine these compartments with a vessel on the dock, and at all times much unnecessary labor is involved



Shaft manufactured by the Bethlehem Steel Co., South Bethlehem, Pa., for the Iowa Iron Works, Dubuque, Ia., to be used in a large stern-wheel steamer which that company is building for the Monongahela River Consolidated Coal & Coke Co. of Pittsburgh. This is the largest stern-wheel steamer shaft ever turned out by the Bethlehem Steel Co. and is probably the largest ever made in the United States. A special ingot of extraordinary dimensions had to be cast and great care taken in the selection of steel entering into the manufacture of the shaft. The splendid equipment of the Bethlehem works for the handling of such massive pieces of steel, both at the forge and in the machine shop, alone made possible the successful completion of this work.

to 3 ft. This height, although permitting work to be done on the bottom, is insufficient for prompt and economical working. From the tests to which the dock was subjected in docking the *Illinois*, the board is of the opinion that the dock is capable of satisfactorily docking a 15,000-ton battleship whenever the necessary depth of water is available upon the site, and it will have with a vessel of this displacement a free board of 21 in. measured to the level of the pontoon deck. The requirement of the original specification, in respect to free board measurement to this level with a 15,000-ton vessel, is 24 in. Changes were, however, made in the structure of the dock during construction, entailing a reduction of 3¼ in. in the free board required.

"During the docking of the *Sterling* and *Illinois* there were no indications of any defect, weakness or imperfection due to faulty or imperfect material, workmanship or design in the dock or its accessories and appurtenances, except as follows: The effect of the *Sterling* (effect of loads) was slight, there being but about 0.050 ft. maximum longitudinal deflection and 0.020 maximum athwart-ship deflection, and no evident twisting, but an almost imperceptible set was observed upon its undocking. The *Illinois* produced a maximum longitudinal deflection of 0.220 ft. and a maximum lateral deflection of 0.32 ft., a slight twist and a maximum permanent set of 0.101 ft. The effect of temperature was so erratic that no uniform results were obtained. The dock does not fulfill the specifications as to maximum allowable deflections, although the above amounts are believed not to be dangerous to vessels being docked, and it is recommended that these requirements of the specifications be waived.

"The engine room floors should be stiffened to reduce the vibrations of the engines. The machinery deck leaks in places and should be made tight. Unlocated leaks in structure, which prevent dock being held in one position without pumping into, exist. These leaks should be located and made tight. The side walls of the dock over the gangway openings are structurally weak, though not dangerously so, and should be properly stiffened. The engines should be examined and valves adjusted. Drain should be fitted to steam whistle. Smokepipes of boilers should be lengthened about 12 ft. for improving draft. New grate bars giving more air space should be furnished. All steam pipes and valve chests of main

in such an examination. In the docking and unloading, the inboard rails interfere seriously with the handling of the lines."

The drainage of the pontoon deck is considered slow and unsatisfactory. The current through the dock of 1¾ knots, they say, increased the difficulties in handling the shores and interfered with the cleaning of the vessel as the dock was being pumped. The following are the modifications and changes recommended at the expense of the government:

"First—Inboard rails on side walls of dock should be removed, and fore and aft string pieces fitted with cleats for small lines.

"Second—Additional bollards and chocks for docking lines should be fitted.

"Third—Suitable means of communication, which will not be interrupted by a ship in the dock, should be established between the two valve-houses.

"Fourth—Means should be provided to show the depth of water in each compartment.

"Fifth—Remove all but forward winches and substitute four capstans on each side, operated by engines below the upper deck.

"Sixth—That an independent fire system with mains be installed near the tops of the side walls of the dock, with portable connections to fire waters of vessels in dock.

"Seventh—That suitable means be provided to keep the dock clear of floating and submerged drift."

Secretary Long has not expressed any opinion of this report, and probably will await the result of the self-docking test before announcing his approval or disapproval.

Mr. Elbert H. Gary, chairman of the board of directors of the United States Steel Corporation, has been elected chairman of the board of directors of the Allis-Chalmers Co. of Chicago, the largest machinery company in the world.

Great anxiety prevails in British naval circles concerning H. M. S. *Condor* which is more than seven weeks out from Puget Sound en route to Honolulu. Two United States revenue cutters have been sent in search of her.



### A RECORD REPAIR JOB.

Probably the quickest repair job of its kind ever made in this country was recently completed by the Fore River Ship & Engine Co. of Quincy, Mass. The British steamship *Isle of Kent* of 3,038 gross tons was in collision with the Spanish steamship *Amesti*, on Dec. 14, about 350 miles east of Boston light. The *Amesti* was struck amidships on the starboard side, the *Isle of Kent* hitting her bow on, and so great was the force of the blow that she was practically cut in half and sank in about fifteen minutes, the crew, however, being saved. The *Isle of Kent* carried a cargo of cotton for a European port and the fact that her fore peak, forward of the collision bulkhead, was full of cotton probably saved the vessel, for the cotton, acting as a cushion, prevented the damage from extending back of the bulkhead and she was able to reach the port of Boston.

After discharging 800 bales of cotton from number one hold, the vessel was placed in dry dock for survey, and the accompanying photographs show the condition of the stem and adjoining plating, two plates having been taken off to enable the removal of cotton in the fore peak. The injuries were found to involve about thirty plates and five pairs of frames, and bids for permanent repairs were opened Dec. 30, the bids being as follows: Bertelsen & Peterson, \$18-950, time fifty-five days; Lockwood Mfg. Co., \$24-985, time forty days; Atlantic Works, \$22,450, time forty days; Fore River Ship & Engine Co., \$23,250, time twenty-five days; Fore River Ship & Engine Co., \$25,500, time twenty days.

The twenty-five day proposition of the Fore River Ship & Engine Co. was accepted, the contract exacting a demurrage of \$250 per day for failure to complete within the time specified. Within three days after signing the contract the steel forging for the stem was completed, it being in one piece 62 ft. long and 10 x 23/4 in. section. Had it not been for the company's forge equipment, the obtaining of such a forging would have been attended with serious delays. Although the work was carried on at East Boston, some ten miles from the Fore River Plant, this disadvantage did not prevent the completion of the contract well within the time agreed upon. The floating machine shop was towed from Quincy to the dry dock, thus greatly facilitating much of the work, and the company's steam lighter was in service between the works and the ship.

Those familiar with such repair jobs in this and other countries expressed surprise at the despatch with which the work was carried on and also their belief that it was a record job, the ship having been floated out of dock in nineteen and a half working days, the job fully completed in twenty-four days and the cargo re-stowed and the vessel ready to leave port on the evening of the twenty-fifth day.

### ENGINES FOR THE KROONLAND AND FINLAND.

Philadelphia, Jan 29.—The William Cramp & Sons Ship & Engine Building Co. has about completed the main propelling engines to be installed in the new steamships *Kroonland* and *Finland*, building for the International Navigation Co. These vessels are 580 ft. between perpendiculars, 70 ft. beam and the loaded draught will be 30 ft. Their registered tonnage will be 12,000. Although not designed especially for speed, it is safe to say that greater care has been exercised in fitting up their machinery than in the instance of any vessel ever built in a Delaware river ship yard. The engines are of quadruple-expansion type, direct-acting and surface-condensing. Diameters of the cylinders are as follows: High-pressure, 31 in.; first-intermediate, 44 in.; second-intermediate, 62 in., and low-pressure, 88 in., with a stroke of 54 in. The high-pressure and the two intermediate cylinders are fitted with piston valves, and the low-pressure has two treble-ported flat valves. All the valves are worked by a radial valve gear operated by a single eccentric through a quadrant rocking on trunnions. The reversing is obtained by moving the sliding block attached to the valve spindle from one end of this quadrant to the other. The lap and lead are obtained by a separate lever worked from

the crosshead of the main engine. This arrangement of the valve motion allows the valves of the engine to be placed at the back, thus bringing the centers of the cylinders much closer together, and in addition to economizing space in the engine department adding to the cargo capacity of the ship. The total length of the engines is about 29 ft., which is much less than could be obtained if the ordinary link gear had been used. The reversing gear is controlled by a steam direct-acting engine.

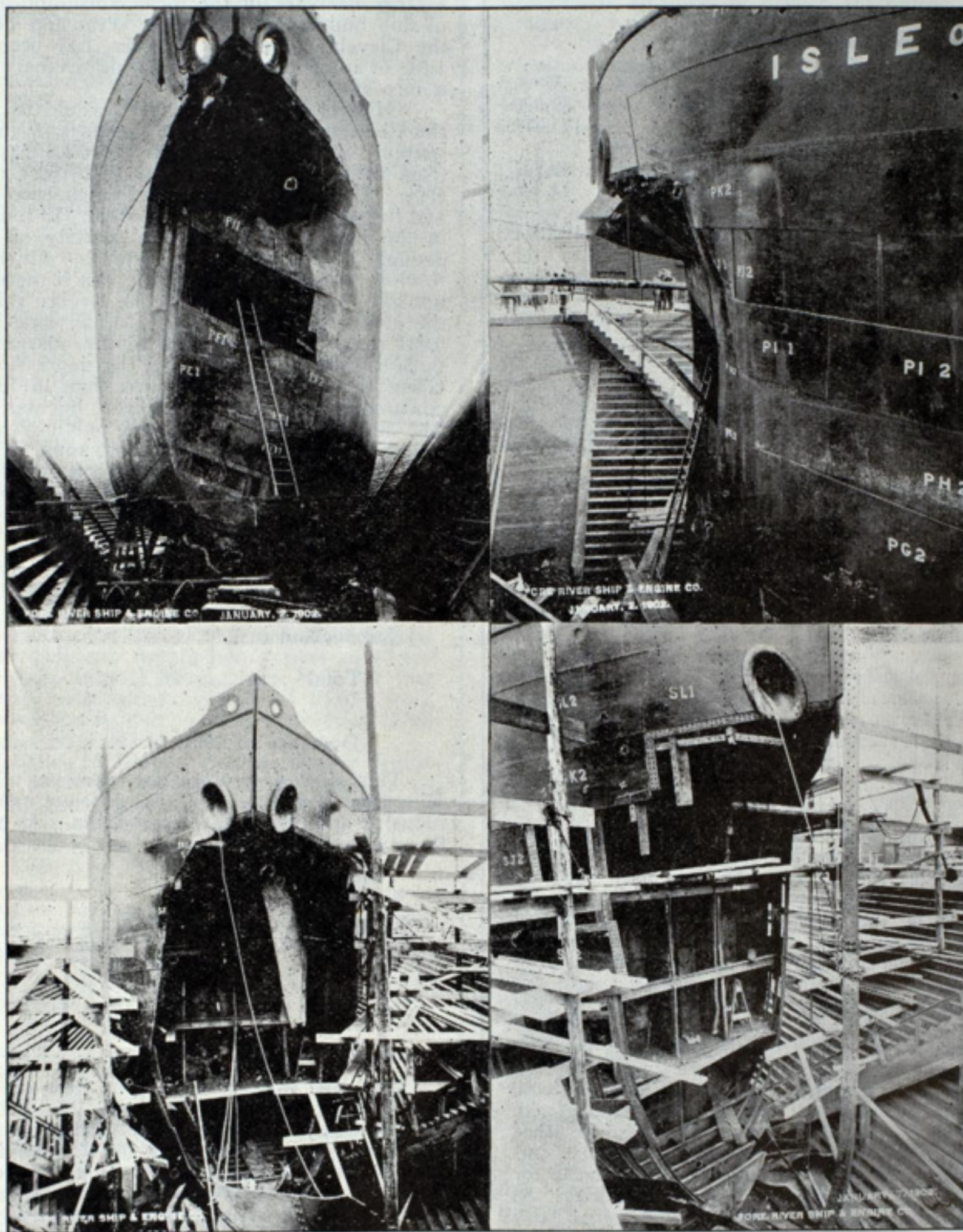
The shafting is of Siemens-Martin steel. The four cranks are each built up separately and are interchangeable. The crank shaft is 17 1/4 in. in diameter, the thrust shaft 17 1/4 in. and the tunnel shaft 16 1/2 in. The thrust blocks are of the ordinary horseshoe type, of white metal, and there are eight rings. The blades of the propeller are of manganese bronze, while the boss is of cast steel. The condensers are oblong and support the backs of the cylinders. They are of cast iron and are fitted with brass tubes, the cooling surface being about 7,000 sq. ft. for each condenser. The condensing water to each condenser is circulated by a large centrifugal pump, driven by an independent engine, the connections being made between the two condensers.

The air pumps are driven by a lever working from the crosshead of the second intermediate engine in the usual way. There are also fitted two large evaporators to produce the necessary fresh water from the sea to make up the feed, and to avoid the use of salt water in the boilers. Two large feed heaters and filtering arrangements are provided. An auxiliary condenser has also been fitted up and when placed on board will have a separate circulating pump so that all the auxiliary machinery in the ship can be worked separately from the propelling engines. There will be an installation of Worthington pumps.

Work on the boilers, which is also speeding, is of interest. The boilers are single-ended, eight in number, constructed of steel and adapted for a working pressure of 200 lbs. per square inch. There are four furnaces to each boiler or thirty-two in all, these being Brown's suspension type. The boilers are fitted with Serve tubes, 3 1/4 in. external diameter. The Ellis & Eaves system of induced draft is fitted to the boilers. The boilers are in two compartments, leading into two funnels, which are 98 ft. high from the grate level and elliptical in plan, 13 ft. 6 in. by 8 ft. 6 in. The fans are eight in number and 7 ft. 6 in. in diameter and are driven direct by Sturtevant engines. These fans, situated directly under the funnels, induce a draft through the furnaces, the air having previously been heated by passing through tubes placed in the way of the waste gases from the furnaces. The inlet of air to the furnaces is through tubes placed in a casing over the boiler, thence down a passage in front of the smoke box at the end of the boilers and into the furnaces. The gases from the furnaces, after passing through the boiler, play around the tubes forming the air inlet and subsequently pass through the fans into the funnels.

Mr. Thomas E. Heenan, consul, writing to the state department from Odessa, says:

"The Deutsche Levante Linie, in conjunction with the Hamburg-American line, will, in January, 1902, start a direct line of steamers between New York and Odessa. The combination of these two lines insures the success of this enterprise, as both have a thorough knowledge of the trade relations between the Levant and the United States. The Deutsche Levante Linie sends five steamers each month to Odessa from Hamburg, two of which are classed as express. It is evidently the purpose of the combination to capture the trade of the discontinued Barber line, which ran until recently between Constantinople and New York. The new line will run from New York to Malta, Alexandria, Constantinople, Novorossisk, Batum and Odessa. I am much pleased with the establishment of a direct line between Black Sea ports and New York, but I confess to disappointment that the line is under the German flag instead of our own. I am now in my seventeenth year as consul at Odessa, and during that time have never seen the United States flag at the masthead of a traffic steamer."



PROGRESS OF WORK ON THE ISLE OF KENT.



## MANUFACTURE OF IRON AND STEEL IN GREAT BRITAIN.

[Special correspondence to the Marine Review.]

Glasgow, Scotland, Jan. 21.—Statistics of the Scotch iron trade which are now being issued are of peculiar interest in view of recent developments. What may be called the most striking features of the trade in 1901 were the cessation of deliveries from the United States, the appearance of pig iron from Canada and steel plates from Germany, and a decrease in the production and an increase in the consumption of pig iron in Scotland. That the consumption of pig iron should have increased here is not surprising considering the enormous work at the ship yards. But the increase has not been in the consumption of Scotch iron, although more than half the present output of the Scotch furnaces is in steel-making qualities. There was a decrease in the output of 39,906 tons, and a decrease in the consumption of Scotch iron in Scotland of 128,859 tons. But on the other hand there was a large increase in the consumption of English iron, and there was a new consumption of Canadian iron. Let me set forth the position thus:

## STATISTICS OF SCOTCH PIG IRON.

	1901, Tons.	1900, Tons.	Inc. Tons.	Dec. Tons.
Production .....	1,113,990	1,153,896	.....	39,906
Consumption: In foundries .....	160,159	295,538	.....	135,379
In steel and iron works .....	675,773	669,253	6,520	.....
Shipments: Foreign .....	118,090	157,817	.....	39,727
Coastwise .....	159,357	173,682	.....	14,325
Total deliveries .....	1,113,379	1,296,290	.....	182,911
Stocks to Dec. 31:				
In warrant stores .....	58,324	71,286	.....	12,962
In makers' yards .....	76,933	63,360	13,573	.....
Average furnaces in blast .....	80.7	83.60	.....	.....
Average per furnace per week, tons..	268	265	.....	.....
Average price of warrants .....	53s 9p	69s 4p	.....	.....

It will be seen that the deliveries were just 611 tons short of the output, so that is the net addition to the stock, although makers wind up the year with 13,573 tons more, and the public warrant stores with 12,962 tons less than at the end of 1900.

The above table shows a decrease of 135,379 tons of Scotch iron consumed in the foundries and an increase of only 6,520 tons consumed in the malleable iron and steel works. How then were the increased demands of the ship builders for material met? Not by our importation of material from the United States, and only to a comparatively small extent by the importation of steel plates from Germany, but by the importation of pig iron from England and Canada. The following was the actual consumption of pig iron in Scotland:

	1901. Tons.	1900. Tons.
Scotch iron .....	835,932	964,791
Cleveland iron .....	456,000	278,000
Cumberland iron .....	114,000	169,000
Canadian iron .....	53,000	.....
Total .....	1,458,932	1,411,791

The net increase in the consumption, it will be seen, is 47,141 tons, and thus it closely approximates the quantity imported from Nova Scotia and one wonders from what quarter the want would have been supplied had the Cape Breton furnaces not been ready to ship. This iron is not suitable for steel making except by the basic process, and there are at present only four basic furnaces in Scotland. The iron ore import from Cumberland is all hematite for steel making. What we import from Cleveland is partly hematite, but mainly foundry qualities. And the reason we have been able to absorb so much Cleveland iron in the past year has been because it has ranged F. O. B. from 8 to 13 shillings per ton lower than Scotch. The usual difference is 5 to 6 shillings per ton, and the larger margin last year was caused partly by a corner in Scotch warrants and partly by a decline in the foreign demand for Cleveland iron, in consequence of which the stocks increased and the market dropped. But perhaps we should have been compelled to import Cleveland or other iron even had the market conditions been less favorable, because our smelters found it more profitable to put their furnaces on to hematite for the steel manufacturers than to make ordinary iron for the foundries. At any rate forty-six out of eighty-one furnaces in blast have been on steel making iron. I think the following will sum up the situation clearly as far as Scotch pig iron is concerned:

## SUMMARY OF SCOTCH PIG IRON.

	Tons.
Stock, Dec. 31, 1900 .....	134,646
Production in 1901 .....	1,113,990
	1,248,636
Deliveries:	
Foreign .....	118,090
Coastwise .....	159,357
Scotch foundries .....	160,159
Scotch steel works, etc. ....	675,773
	1,113,379
	135,257
Stock, Dec. 31, 1901:	
In warrant stores .....	58,324
In makers' yards .....	76,933
	135,257

The output of Cleveland is not known with the same precision, as the makers there do not afford any information, but from the quantity of ore known to have been imported, and the quantity taken from the local mines, a fairly approximate estimate can be made; and the estimate is that the production of the Cleveland furnaces last year did not exceed 3,000,000 tons and probably was not more than 2,800,000 tons. In the meantime we may take it as 2,750,000 tons, as compared with 3,110,000 tons in 1900.

Notwithstanding this decrease in the make, the public stock has increased in one year from 57,802 tons to 140,676 tons, and the quantity on warrant at Middlesboro is nearly two and a half times as much as the quantity on warrant at Glasgow—a quite unprecedented position until last year. What stock is held by the Cleveland makers is not known, but it is believed to be less than a year ago, the surplus having gone into store. There should not, of course, have been any surplus on a make so reduced had the home and foreign demand remained unbroken, but the foreign shipment from Middlesboro dropped from 780,421 tons in 1900 to 494,055 tons in 1901. To some extent this was compensated by the increased demand from Scotland, which helped to raise the coastwise shipments from 211,557 tons in 1900 to 466,730 tons in 1901; but the total of all deliveries by sea fell short of 1900 by 31,000 tons. That, again, would not account for an increase of 83,220 tons in the public stocks, so that there must have been a large decrease in the local consumption, notwithstanding the activity of ship building on the Tyne, Wear and Tees. A notable development in the Cleveland district, however, has been the adoption by Bell Bros., Ltd., of a new process for treating ordinary Cleveland iron, and converting it into steel.

Of steel-making iron there would be about 750,000 tons included in the Cleveland output above named and about 60 per cent. of the Scotch output. In Cumberland and West Lancashire the production of pigs from native hematite ore was 1,309,700 tons, or 103,640 tons less than in 1900. There the furnaces are much larger than in the Glasgow district and turned out an average of about 713 tons each per week. The decrease in the make is attributed to scarcity of raw material, dear labor, and drought during the summer months, which compelled some of the works to close altogether for a time. But if there had been more made it would not have been absorbed, for the foreign shipments fell off by 119,119 tons, the coastwise shipments by 150,425 tons, and the local consumptions by 6,624 tons. The shipments to the continent were less than one-third of those of 1900, so extreme is the depression there; and the shipments to Glasgow were 55,000 tons less than in 1900—not because Scotland was consuming less steel-making iron, but was supplying her wants otherwise. The stocks in the Cumberland public stores were reduced 5,322 tons in 1901 and stand now at only 53,968 tons. This is practically all the reserve of hematite iron there is in the country, so any sudden expansion in the demand for steel material would create something of a wobble.

To sum up, the production of pig iron in the three great ship building centers has been as under:

	1901. Tons.	1900. Tons.
Scotland .....	1,113,990	1,153,896
Cleveland .....	2,750,000	3,110,000
Cumberland .....	1,309,700	1,413,340
Total .....	5,173,690	5,687,236
		5,173,690
Decrease in 1901 .....		513,546

This, of course, does not represent all the production of the United Kingdom, but only of those districts concerned with the ship building industry and the chief export trade. As to exports to foreign countries there were:

From	1901. Tons.	1900. Tons.
Scotland .....	118,090	157,817
Cleveland .....	494,055	780,421
Cumberland .....	56,474	175,593
Total .....	668,619	1,113,831
		668,619
Decrease in 1901 .....		445,212

The total exports of pig iron from the United Kingdom in 1901 were 839,223 tons. On the other hand 195,409 tons were imported (as against 175,393 tons in 1900), of which 69,234 tons were from Sweden, 35,272 tons from the United States and 90,903 tons from Canada, Spain and other countries. The total quantity from Canada would be about 55,000 tons or so, of which 53,000 tons came to Scotland. Then we also imported 98,100 tons of bar and rod iron, principally from Belgium and Germany, and 182,884 tons unmanufactured steel, principally from Germany, both figures being in excess of 1900; but we re-exported 12,400 tons of the foreign iron and 1,723 tons of the steel, which only came to us for purposes of transshipment.

As showing the decline in prices, I give the prices of the several classes of pig iron warrants at the beginning and at the end of 1901:

Warrants.	Jan., 1901.	Dec., 1901.
Scotch .....	58s 6p	49s
Cleveland .....	50s	43s 3p
Cumberland .....	63s	55s 6p

The greatest decline has been in Scotch, which has been relatively dearer than others most of the year; and makers say it is now below the cost of production.

The steamship Strombus, one of the Shell company's vessels, which has burnt liquid fuel since she was built, has just finished an eastern voyage at Hamburg, having burnt liquid fuel with great economy and success. This vessel goes from Hamburg to Thameshaven to replenish her oil bunkers from the stock there preparatory to commencing her voyage to Texas, where she will take on a cargo of liquid fuel, in succession to the steamship Cardium, also engaged in the same trade. It is stated that a reduction of 30 per cent. has been obtained in the Strombus with liquid fuel as compared with coal, not counting the economy of reduction of stokehold hands and increased deadweight for cargo.

Henry Komtzky, naval architect and marine surveyor, has opened an office in the Bourse (room 416), Philadelphia.



## WORLD'S SHIP BUILDING DURING 1901.

IN THE UNITED KINGDOM IT HAS BEEN ALMOST TOTALLY OF STEEL—TENDENCY TOWARD LARGER SHIPS—UNITED KINGDOM CONTROLS NEARLY 45 PER CENT. OF THE NEW TONNAGE.

According to Lloyds' returns there were launched in the United Kingdom during 1901, exclusive of warships, 639 vessels of 1,524,739 tons gross, of which 591 were steamers of 1,501,078 tons and forty-eight were sailing vessels of 23,661 tons. The warships launched at both government and private yards number forty-one of 211,269 tons displacement. The total output of the United Kingdom for the year has, therefore, been 680 vessels of 1,736,708 tons.

As regards both merchant ships and warships, the output of the year in the United Kingdom has surpassed all previous records of Lloyds' register. The returns of mercantile tonnage launched in 1899 and 1900, which were themselves unprecedented, have now been exceeded by 108,000 tons and 82,000 tons respectively. For warships, the highest total hitherto reported, viz., 191,000 tons, which was reached in 1898, is less by 20,000 tons than the figures for 1901.

The output of 1901 is almost entirely composed of steam tonnage. In 1889, 10 per cent. of the output was composed of sailing tonnage. For the four following years (1890 to 1893), the proportion rose to 19 per cent. After that period, the construction of sailing vessels rapidly declined, until in 1899 sailing tonnage formed less than 0.14 per cent. of the output. During 1900 and 1901 there has been some recovery, and the percentage of sailing tonnage now stands at 1.5 per cent.

As regards the material employed for ship building purposes in 1901, it is found that over 99.8 per cent. of the tonnage has been built of steel. Of the total output, 1,149,306 steam tons and 18,496 sailing tons, or 1,167,802 tons in all (nearly 77 per cent.) belong to ports in the United Kingdom. In this connection, it may be noted that the losses, etc., of United Kingdom vessels during twelve months are shown by Lloyds' register wreck returns to average 279,000 tons (205,000 steam, 74,000 sail). Sales to foreign and colonial owners for the twelve months ended November, 1901, reached a total of 404,000 tons (330,000 steam, 74,000 sail). On the other hand, purchases from foreign and colonial owners during the same period amounted to 58,000 tons (45,000 steam, 13,000 sail). The sailing tonnage of the United Kingdom would thus appear to have decreased by about 116,000 tons, while the steam tonnage has increased by 659,000 tons. The net increase of United Kingdom tonnage during 1901 is therefore about 543,000 tons. This figure exceeds all similar estimates since 1892. For the last three years the estimated increases were as follows: 1898, 327,000 tons; 1899, 313,000 tons; 1900, 220,000 tons.

In 1901, as in 1900, about 23 per cent. of the total output has been built to the order of foreign and colonial ship owners, as compared with 19 per cent. in 1899, 22 per cent. in 1898, and 25 per cent. in 1897. As was also the case in 1899 and 1900, Germany has this year provided the largest amount of work for British ship builders, twenty-two vessels of 83,432 tons (nearly 5.5 per cent. of the total output) having been built for that country. Austria-Hungary follows with twenty vessels of 64,374 tons. Next come Holland with 61,888 tons; the British colonies with 28,569 tons; Russia with 25,684 tons; and France with 20,609 tons.

The annual ship building statistics of Lloyds' register during recent years have illustrated the steady tendency towards the construction of vessels of large tonnage. In 1892, thirty-seven steamers were launched in the United Kingdom of 4,000 tons and above; in 1895, fifty; in 1898, 83; in 1900, 125; and in 1901 the number has risen to 140. Among these last are eight vessels exceeding 10,000 tons, viz.:

Tons gross.		Tons gross.	
Celtic .....	20,904	Noordam .....	12,340
Minnetonka .....	13,400	Rijndam .....	12,302
Walmer Castle .....	12,570	Haverford .....	11,635
Athenic .....	12,500	Merion .....	11,635

Three sailing vessels over 3,000 tons have been launched in the United Kingdom during 1901, viz.:

Tons gross.		Tons gross.	
Brilliant .....	3,765	Comet .....	3,014
Daylight .....	3,700		

Of the principal ship building centers of the country, Newcastle takes the lead, showing an output of 292,989 tons. Then follow in order Glasgow (274,606 tons), Sunderland (268,069 tons), Greenock (163,816 tons), Middlesbro' (161,058 tons), Hartlepool (150,607 tons), and Belfast (149,705 tons). In warship tonnage the leading ports stand thus: Glasgow (60,200 tons), London (30,815 tons), and Barrow (26,700 tons).

The returns for the year under review include eighty-two steam trawlers and other fishing vessels; fifty-four dredgers, barges, etc.; thirteen yachts; nineteen tugs; three vessels intended to carry oil in bulk; and other vessels designed for special service.

As regards the movements of the ship building industry during the course of 1901, Lloyds' register returns show that, irrespective of warships, the total tonnage under construction in the United Kingdom on Dec. 31, 1901, exceeded that under construction twelve months previously by about 89,000 tons, or 7 per cent. At the close of 1900, 1,269,919 tons (1,256,119 steam, 13,800 sail), were being built. The returns for the March and June quarters of 1901 showed an increase of rather more than 30,000 tons on the December figures; and the returns for the September quarter (1,414,120 tons), showed the highest figures recorded in the history of the ship building industry. At the present time 1,359,205 tons (1,327,702 steam, 31,503 sail) are under construction in the United Kingdom. It should be added that the amount of warship tonnage under construction in the country is now smaller than it has been since December, 1897. The highest total recorded by Lloyds' register was reached in March, 1900, when 454,000 tons displacement were in hand. The total is now 330,000 tons.

There have been built outside of the United Kingdom during the year, 446 steamers of 800,849 tons and 453 sailing vessels of 291,951 tons, in addition to eighty-two war vessels of 255,000 tons displacement. Among these countries, the three leading places are held by the United States of America (433,000 tons), Germany (218,000 tons), and France (177,000 tons). Of the mercantile tonnage reported from the United States, a considerable proportion does not affect the general commerce of the world, being intended for service on the great lakes. As showing the size

of vessels employed in that trade, it may be mentioned that sixteen steamers have been built for it during 1901 of upwards of 4,000 tons each. On the coast, fourteen steamers of over 4,000 tons each, two steel sailing vessels each about 3,300 tons, and six wooden sailing vessels of over 2,000 tons each, have been launched in 1901.

Germany has launched the following steamers of large tonnage, viz.:

Tons gross.		Tons gross.	
Kronprinz Wilhelm .....	14,908	Moltke .....	12,372
Blücher .....	12,372		

No very large sailing vessels are included in the output of Germany during the year, but it may be noted that a steel five-masted ship of 5,200 tons is being built on the Weser under the survey of Lloyds' register.

In France, the construction of large steel sailing vessels has continued to flourish under the influence of the bounties granted by the state. Forty-nine such vessels, of 2,000 tons and upwards, have been launched during the year under review. The largest of these is the Leon Blum, of about 3,200 tons, built near Rouen. Some expansion is noticeable in the construction of steamers in France, the output being 53,000 tons in 1901, as compared with only 20,000 tons in 1900.

In Italy, the mercantile output of the year is 60,500 tons. There has been a considerable reduction in the tonnage on the stocks in Italy during the last two years. In December, 1899, the tonnage in hand amounted to 107,000 tons; in December, 1900, to 87,000 tons; it has since fallen to 61,000 tons.

The total output of the world during 1901 (exclusive of warships) appears to have been about 2,617,000 tons (2,302,000 steam, 315,000 sail). Lloyds' register wreck returns show that the tonnage of all nationalities totally lost, broken up, etc., in the course of twelve months amounts to about 746,000 tons (361,000 steam, 385,000 sail). It will thus be seen that, while the sailing tonnage of the world has been reduced by about 70,000 tons during 1901, the steam tonnage has been increased by about 1,941,000 tons. The net increase of the world's mercantile tonnage is, therefore, 1,871,000 tons.

Compared with this net increase for the world, the net increase of 543,000 tons, as stated above, for the United Kingdom is equivalent to 29 per cent. In the net increase of the world's steam tonnage, viz., 1,941,000 tons, the United Kingdom has shared to the extent of 659,000 tons, or 34 per cent. Of the new tonnage launched during 1901, the United Kingdom has acquired nearly 45 per cent.

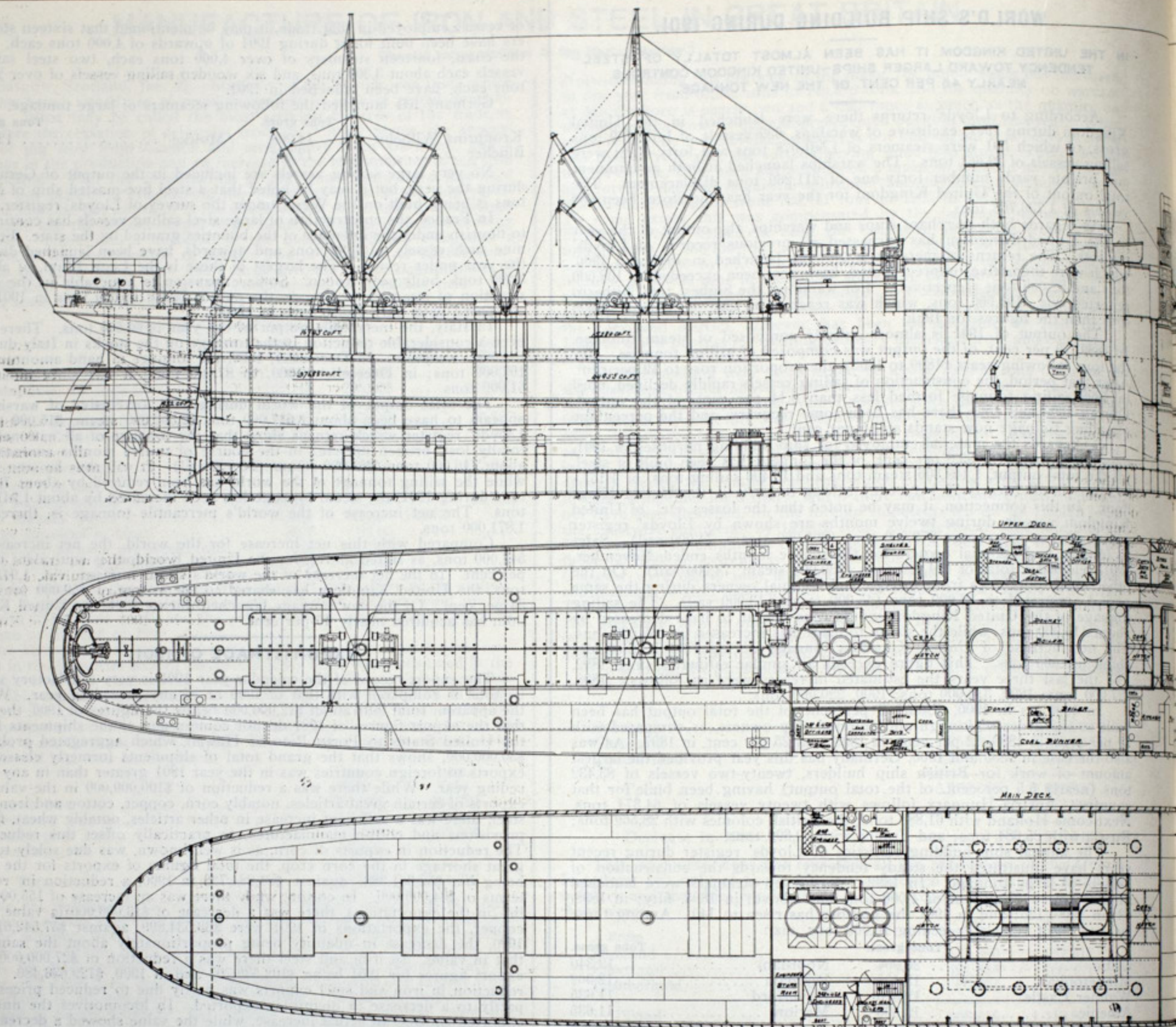
## EXPORT-TRADE OF 1901.

The export record of the calendar year 1901 is very satisfactory when its total is compared with that of 1900 or of any preceding year. While the apparent total falls about \$12,000,000 below the figures of 1900, the fact that the export figures of 1901 do not contain any of the shipments from the United States to Porto Rico or Hawaii, which aggregated probably \$30,000,000, shows that the grand total of shipments formerly classed as exports to foreign countries was in the year 1901 greater than in any preceding year. While there was a reduction of \$100,000,000 in the value of exports of certain great articles, notably corn, copper, cotton and iron and steel, there was a sufficient increase in other articles, notably wheat, flour, provisions and cotton manufactures, to practically offset this reduction. The reduction in exports of corn, as is well known, was due solely to the great shortage in the corn crop, the total figures of exports for the year being but \$50,361,388, against \$84,284,733 in 1900, a reduction in round terms of \$34,000,000. In cotton, while there was an increase of 155,000,000 lbs. in the exportations, there was a decrease of \$13,000,000 in value. Of copper, the exportations in 1901 were \$33,534,899, against \$57,542,610 in 1900, the decrease in quantity being proportionately about the same as that in value. In iron and steel there was a reduction of \$27,000,000, the export figures for 1901 being \$102,539,797 and in 1900, \$129,633,480. This reduction in iron and steel exports was partly due to reduced prices and partly to a decrease in quantities exported. In locomotives the number exported showed an actual increase, while the value showed a decrease of about \$400,000. In various other manufactures of iron and steel the reduction in value was proportionately greater than the reduction in quantity, but there were material reductions in quantity in certain articles. Bars or rods of steel fell in exportations from 106,000,000 lbs. to 79,000,000 lbs.; steel rails, from 356,245 tons to 318,055 tons; wire nails, from 61,385,843 lbs. to 42,050,602 lbs.; and steel sheets, from 101,995,225 lbs. to 53,588,154 lbs. Tin plate showed a material increase in exportations, though the quantity is as yet comparatively small, being in 1900 612,251 lbs. and in 1901 983,383 lbs. Wire showed an increase from 174,751,042 lbs. to 197,651,789 lbs. Another indication that the reduction in the value of exports is due quite as much to a fall in prices as in quantity is found in the fact that while the quantity of refined mineral oil exported showed an increase of nearly 100,000,000 gallons, the value showed a decrease of about \$1,000,000; the total exportations of refined mineral oil in the year amounted to 924,198,170 gallons, against 828,945,305 gallons in 1900; while the value in 1901 was \$65,492,359, against \$66,307,621 in 1900.

The five principal articles which show a decrease are corn, iron and steel manufactures, copper, cotton and mineral oils; and of these cotton and mineral oils both show an actual increase in quantity though a decrease in value. This aggregate of practically \$100,000,000 reduction in the exports of these five articles is nearly offset by the increase in exports of wheat, provisions, live animals and cotton manufactures, cotton seed oil and oil cake and leather and manufactures thereof. Add to this the further fact that the shipments to Hawaii and Porto Rico aggregated probably fully \$30,000,000, and the record of 1901 will compare favorably with that of any preceding year.

The distribution of this large total, really the largest total of shipments ever passing out of the country, shows an increase everywhere except to Europe. The exports to Europe for 1901 were about \$17,000,000 less than in 1900; to North America, there is an increase of about \$1,000,000; to South America, an increase of about \$1,000,000; to Asia about \$1,000,000; to Africa, \$6,000,000; and while the official figures of exports to Oceania fall \$4,000,000 short of those of last year, the fact that none of the shipments to Hawaii are included this year and that about \$7,500,000 to Hawaii were included in 1900, in the figures of exports to Oceania, shows that the actual shipments to Oceania in 1901 were in excess of those of 1900 or of any earlier year, since there is every reason to believe that the shipments to the Hawaiian Islands alone exceeded \$20,000,000 in the year 1901.





GENERAL ARRANGEMENT PLAN OF STEAMERS MINNETONKA AND MINNETONKA

**SHIP BUILDING AT NEWPORT NEWS.**

Newport News, Va., Jan. 29.—The new Morgan line steamship El Alba left early in the week for New York on her maiden voyage, having had her builder's trial a week ago Saturday. This is the twelfth and last steamship of 6,000 tons displacement built by the Newport News Ship Building & Dry Dock Co. for the Southern Pacific Co.'s Morgan line fleet between New York and New Orleans. The contracts were awarded to the ship yard in lots of four each, the total aggregating an expenditure of \$7,200,000, to which must be added the cost of several steel tugs for the same line. The first quartette of ships was turned out in 1891 and 1892, the second just after the Spanish-American war and the third in the past year. El Alba will sail from New York in a week or ten days on her first voyage to New Orleans with freight.

"There are no better ships on the sea for their particular service than the Morgan line vessels," said Capt. R. B. Quick, the commodore of the fleet and master of El Alba. Capt. Quick has spent a large part of his life on the seas and he ought to know. For many years he has been senior captain or commodore of the fleet, as the other officers refer to him. In that capacity he has taken charge of each new vessel as it was turned out a finished ship at Newport News. Eight of these vessels he has sailed from the city of their birth, including El Alba. "The vessels are all alike in essential respects," he continued, "but each one is a little better than its predecessor. Each one makes a new record down the coast on her first trip out and we have come to look for a new record every time we take a new ship to sea from Newport News. El Alba, according to this theory, ought to be the best of the Morgan liners and I believe, with the little improvements which have been made in her case, that she will be."

Capt. Quick was asked relative to a rumor that the Morgan line contemplated building more ships soon. "I don't know about that," he replied, "we are using all of our old ones and they have all they can do. If the ship subsidy bill is passed it will be a great thing for American ship building, and, as you can plainly see, for Newport News. The bill ought to be passed. American shipping needs something of the sort, and whatever theorists say of the subsidy plan, we've got to adopt it if we expect

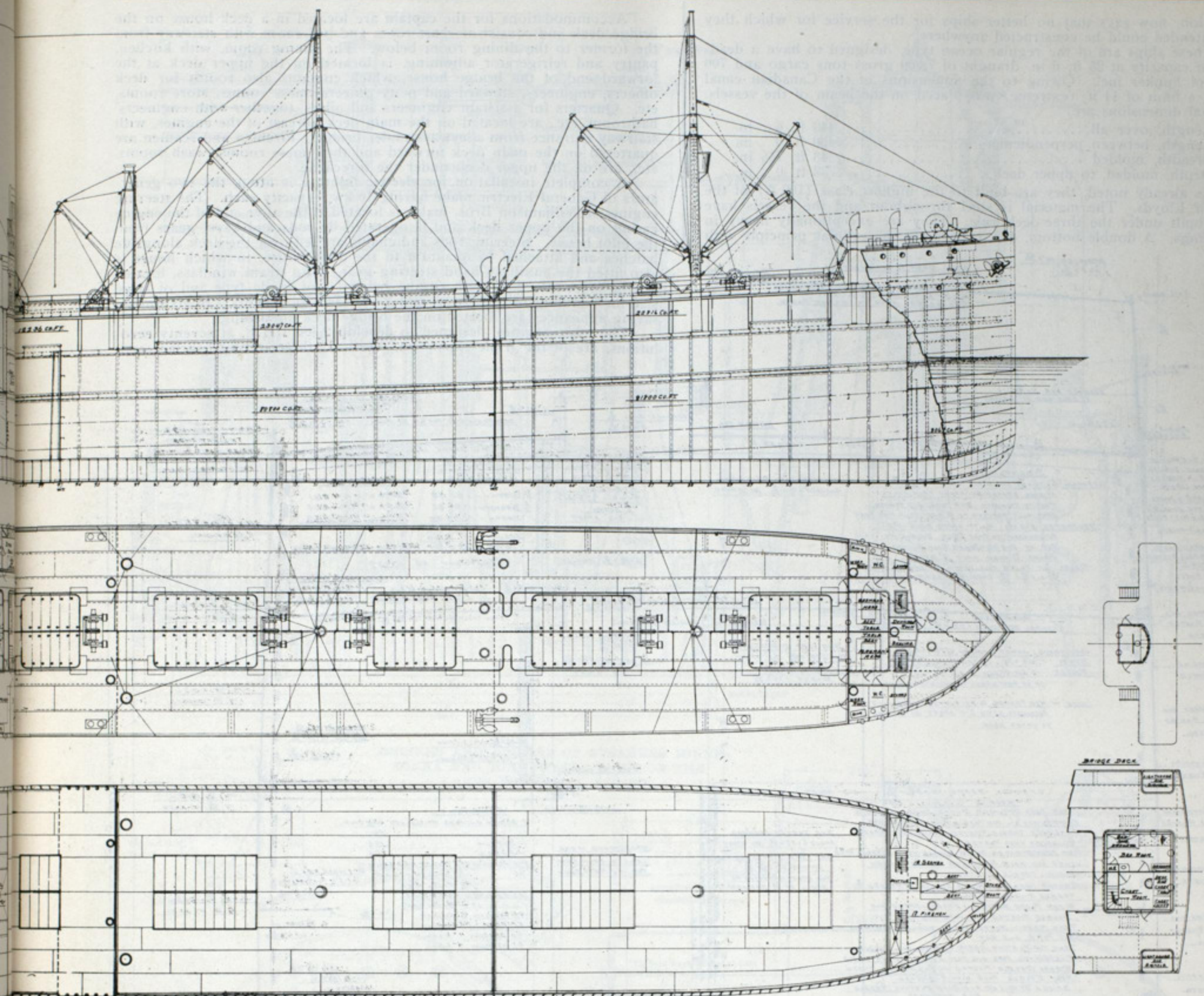
to keep up with other countries. Even then we shall be handicapped, for we shall never get the cheap labor that the foreign countries do in manning their ships. My men get \$25 a month, and, of course, their board. There are some Norwegians and Swedes who get as low as \$8, and as for coolies, they cost nothing—several dollars a month and their keep. There is another thing. We treat our men better in the matter of food and accommodations. The food we give them is of a better quality, of a greater variety and, of course, costs more. For this reason, even with the most advantageous legislation, American shipping is going to have an uphill time of it, so to speak. Our coast trade is, of course, amply protected, and it is a blessing. Only ships flying the American flag can carry cargo from one coast port to another. Foreign vessels, of course, clear coastwise in ballast or with their foreign cargoes, but they cannot carry an ounce of local freight."

The award to the ship yard of another contract for a merchant vessel was announced in the Review of last week. The new steamer, which will be built for the Old Dominion Steamship Co. and which is to cost close on to three-quarters of a million, will be launched in the latter part of the year. The contract calls for completion in fifteen months. It is not unlikely that the ship will be turned out earlier. The new liner will be the queen of the Old Dominion fleet and it is said that the company will probably order one or two more vessels of similar design before this one is placed in commission.

The new steamer Brandon, built for the Old Dominion's night passenger and freight service on the James river, arrived Sunday from the yard of the builders, Harlan & Hollingsworth, Wilmington, Del. On Monday the new vessel had her final trial, which was satisfactory. The Westlake, a sister of the Brandon, building at the Trigg Ship Yard, Richmond, will be launched within a few weeks. These steamers will be elegantly finished and very speedy and will ply by night between Norfolk, Newport News and Richmond similarly to the schedule in operation on the Chesapeake and the Potomac between Hampton Roads and Washington and Baltimore.

The steamer Virginia, for the Chesapeake & Ohio Railway, has been completed at the Trigg Ship Yard and is expected here this week. She





BUILT AT CLEVELAND BY THE AMERICAN SHIP BUILDING CO. FOR OCEAN SERVICE.

will at once go into service between Newport News and Norfolk, replacing the old steamer Louise, formerly the John Romer, which will be used as a reserve boat.

The Pacific Mail steamship Korea, the largest ship ever built on this continent, now presents the appearance of a finished vessel, from the outside, and it is announced that she will be ready to leave here on her long voyage to the Pacific shortly. Material is now arriving at the ship yard in large quantities. Owing to the congestion of freight on the railroads and delays in the mills, material was hard to get here and it became necessary to lay off some men, although there was work for all of them. Now that the material is arriving as needed the men have been replaced and the ship yard is as busy as it ever was.

Within the past week nearly forty car loads of steel billets arrived here from Antwerp, coming in under the head of "consumption" entries. It is impossible to tell in this way to whom the steel is consigned, as it will be taken out as it is needed, but it is believed that it will eventually find its way to the Pennsylvania mills. One firm it is known has placed orders abroad aggregating 3,000 tons of steel and the steamship St. Leonards, which brought the steel here, reports that a chartered ship is now loading at Antwerp 5,000 tons of steel for New Orleans. This is a sign of good times, for it means that the American mills have all of the orders that they can fill.

The battleship Illinois is at anchor off the ship yard, having arrived several days ago from New Orleans via Havana. She recently tested the new floating dry dock at New Orleans and came here to prepare for her sea trial prior to final acceptance by the government from the builders. While here the Illinois will fit out for her duty as flagship of the special squadron under Rear Admiral Evans which will welcome Prince Henry next month. Admiral Evans will raise his flag over the Illinois here shortly. Indeed, it is probable that he will organize his squadron at Hampton Roads instead of Tompkinsville, N. Y., as the Illinois is here, the San Francisco is over at Norfolk navy yard and the Olympia, Cincinnati and Hartford will have to come down the coast anyway, it having been decided that the squadron will meet the Emperor's private yacht in this vicinity on its way up from the West Indies.

### BUILT ON THE LAKES FOR OCEAN SERVICE.

STEAMERS MINNETONKA AND MINNEWASKA, OF 7,000 TONS CAPACITY EACH, WILL SOON BE READY TO BE TAKEN IN SECTIONS TO THE ATLANTIC SEABOARD—DESCRIPTION AND PLANS.

A statement recently compiled from the great volume of information regarding ship building, that is collected each year by the British Lloyds, gave to the American Ship Building Co. of the great lakes the third place among ship builders of the world. Only two of the large ship building establishments of Europe, Harland & Wolff of Belfast and Wm. Gray & Co., Ltd., of West Hartlepool, had launched in 1901 a greater tonnage in merchant ships than was launched from the several works of the American Ship Building Co. on the lakes, and the output of Wm. Gray & Co. was only slightly in excess of that of the American company. This distinction is undoubtedly a matter of pride to Gen. Mngr. James C. Wallace and his associates in the management of the lake yards, but probably no more gratifying to them than their success in having practically completed two large freight steamers that are to be taken to Quebec (each in two parts) next spring, there to be put together for transatlantic service. These steamers are the Minnetonka and Minnewaska, now about finished at the Globe works of the American company, and which were constructed to the order of the American Navigation Co., represented by Chas. E. & W. F. Peck of New York. One of these vessels has been placed in dry dock in Cleveland preparatory to being cut in two for the trip through the Welland and St. Lawrence river canals to Montreal. All plans of these vessels were submitted to Mr. Geo. Stanbury of New York, principal representative of Lloyds' Register in this country. Mr. Stanbury visited the different plants of the American Ship Building Co. before the vessels were put down and expressed great satisfaction with the quality of work then under way. That his view of the situation from the standpoint of the ability of the lake builders to undertake such work was correct, is borne out by the fact that Mr. A. C. Heron, representative of Lloyds, who came from England to the lakes to inspect the vessels while under con-



struction, now says that no better ships for the service for which they are intended could be constructed anywhere.

These ships are of the regular ocean type, designed to have a dead-weight capacity at 25 ft. 6 in. draught of 7,000 gross tons cargo and 700 tons of bunker fuel. Owing to the dimensions of the Canadian canal locks, a limit of 44 ft. (extreme) was placed on the beam of the vessels. General dimensions are:

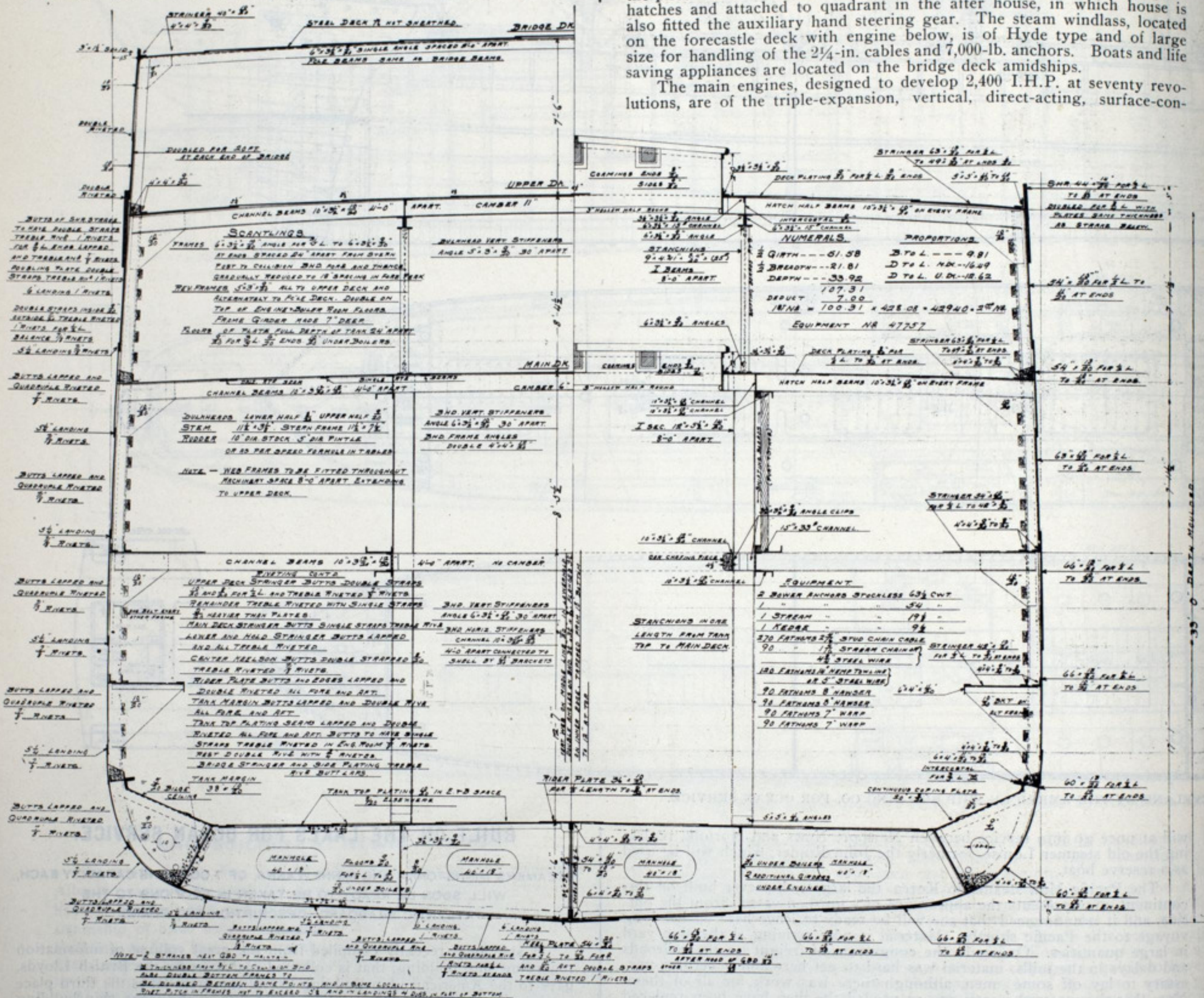
Length, over all.....443 ft. 6 in.  
Length, between perpendiculars.....430 ft. 0 in.  
Breadth, molded.....43 ft. 7½ in.  
Depth, molded, to upper deck.....33 ft. 0 in.

As already noted, they are built to the highest class (100 A) of the British Lloyds. The material is steel throughout and the vessels have been built under the three-deck rule. They are exceptionally heavy in scantlings. A double bottom, 4½ ft. deep, on the cellular principle with

Accommodations for the captain are located in a deck house on the bridge deck and consist of chart room and bed room with stairway from the former to the dining room below. The dining room, with kitchen, pantry and refrigerator adjoining, is located on the upper deck at the forward end of the bridge house, which contains also rooms for deck officers, engineers, steward and petty officers, mess rooms, store rooms, etc. Quarters for assistant engineers and oilers, together with engineers' bathroom, etc., are located on the main deck abreast of the engines, with stairway entrance from alleyways under bridge. Firemen and seamen are quartered on the main deck forward and their mess rooms, wash rooms, etc., are on the upper deck under the forecastle.

A complete installation for electric lighting is fitted, the two generators of General Electric make having 10 kw. capacity each. The steering engine, of Williamson Bros. make, is located at the after end of the engine casing on the upper deck and is operated by rods and bevel gears from the pilot house. Steering rods and chains are led over the deck alongside hatches and attached to quadrant in the after house, in which house is also fitted the auxiliary hand steering gear. The steam windlass, located on the forecastle deck with engine below, is of Hyde type and of large size for handling of the 2½-in. cables and 7,000-lb. anchors. Boats and life saving appliances are located on the bridge deck amidships.

The main engines, designed to develop 2,400 I.H.P. at seventy revolutions, are of the triple-expansion, vertical, direct-acting, surface-con-



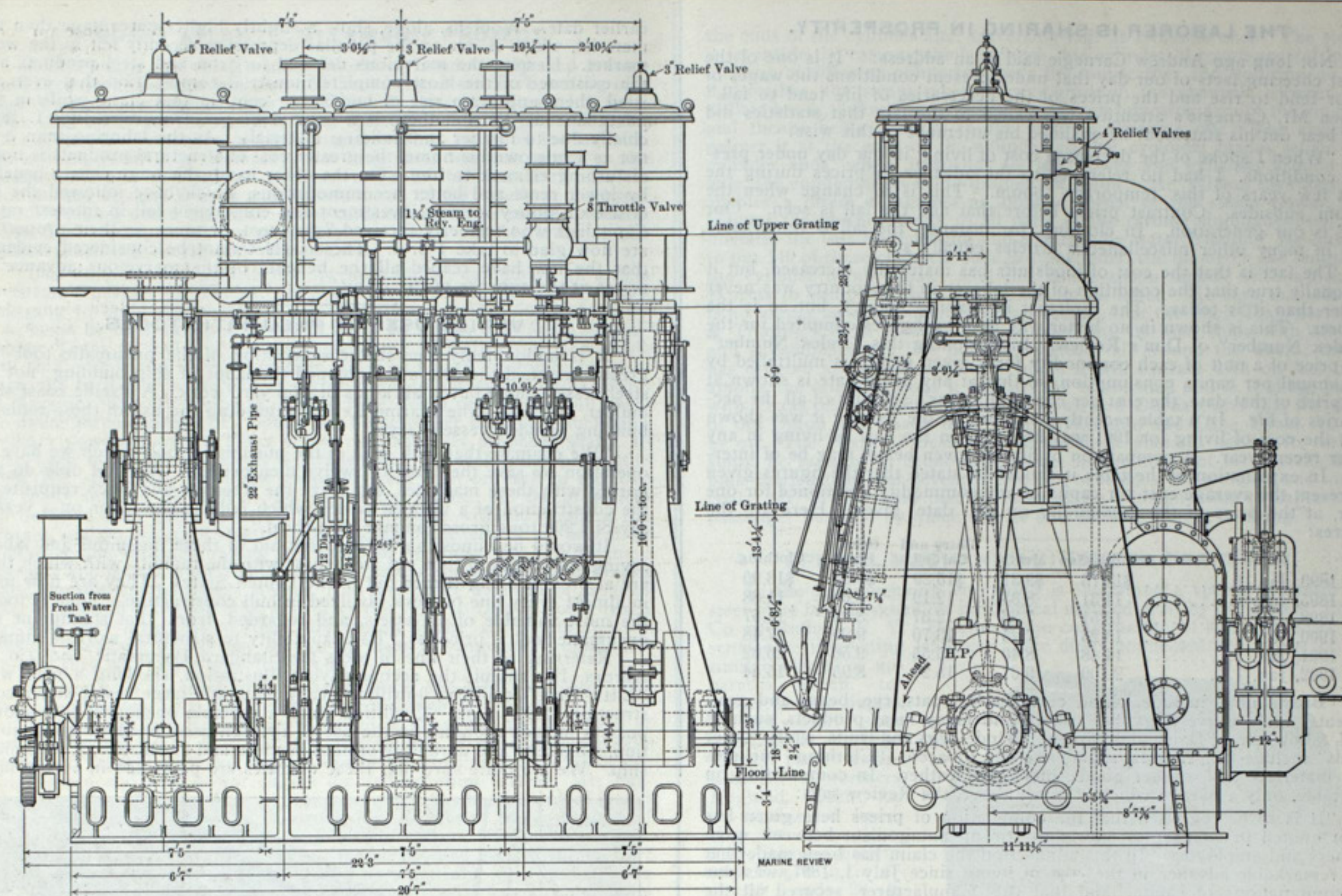
MIDSHIP SECTION OF STEAMERS MINNETONKA AND MINNEWASKA, BUILT ON THE GREAT LAKES FOR OCEAN SERVICE.

solid floors at every frame, extends from the collision bulkhead to the after-peak bulkhead, with a total capacity, including peak tanks, of 1,600 gross tons of water ballast. The upper and main decks are laid complete, but the lower deck is not completely laid, as it was thought advisable to leave open space between beams so as to facilitate stowage of cargo; but as the beams are spaced 4 ft. apart, a deck could be laid temporarily if necessary and made to suit the cargo to be carried. The forward hold is divided into three compartments by two watertight bulkheads, the after compartment forming auxiliary bunker and connected to stokeholds by tunnel through permanent bunkers and watertight door in bulkhead. The after hold is divided into two compartments, making five compartments all told, with entire internal capacity for cargo of 360,000 cu. ft. There are nine hatches and, owing to their size, they give exceptional facilities for the rapid discharge of cargo. As the hatches are all of the same width, viz., 14 ft., they admit of a very satisfactory arrangement of girders under beams, which, with a double row of widely-spaced hold stanchions, make a strong structure and allow of easy stowage of cargo.

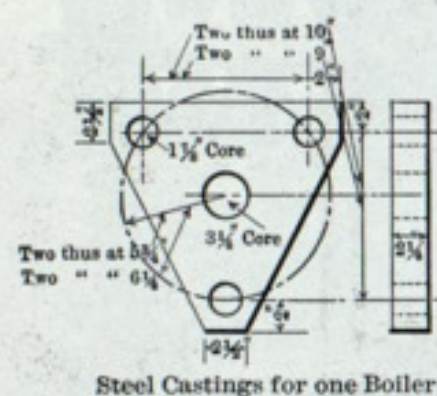
The cargo-handling gear consists of four short steel pole masts, on each of which is fitted four large derrick booms, and in addition, for working No. 5 hatch over auxiliary bunker, two short derrick masts are fitted, each equipped with a cargo boom. There are nine double-cylinder steam winches (one for each hatch), fitted with friction drums for the hoisting of cargo, which will all be done by flexible steel wire rope. Steam for the winches and other auxiliary machinery is supplied by a large donkey boiler, located on the upper deck in bridge house amidships.

densing type, with three cylinders, 27, 42½ and 73 in. diameter by 48 in. stroke. The high-pressure cylinder only is fitted with a liner. Cylinders are arranged from forward in the order of high-pressure, intermediate and low-pressure. The high-pressure and intermediate valves (piston and double-ported slide respectively) are placed between these cylinders and the low-pressure, double-ported slide valve is between the intermediate and low-pressure cylinders. The bedplate is in three pieces, bolted together, and contains six main bearings, 14 in. diameter and 14 in. long, lined with white metal in cast iron circular bushings. The condenser, which is of cast iron, rectangular section, extends about two-thirds the length of the engine at the back, supporting on its top two of the back columns. It contains 3,120 sq. ft. of cooling surface, made up of ¾-in. brass tubes. The circulating water is pumped twice through by a 12-in. centrifugal pump, driven by an independent engine. The three front and forward back columns are of the inverted Y pattern allowing free access to crank pins and bearings. The piston rods are of steel, 6¾ in. diameter, and the connecting rods are 10 ft. between centers. The crank shaft, which is in three interchangeable parts, 14 in. diameter, is of forged steel with wrought iron crank arms. The crank pins are 14 in. diameter by 15½ long. Tunnel and propeller shafts are of forged steel, 13¼ in. and 15¼ in. diameter respectively, the latter being protected in the stern tube by a continuous brass liner. This liner is shrunk on in five lengths, the ends of which are fused together by the pouring of molten brass over the joints. The valve gear is Stephenson double bar link motion throughout, the reversing engines being of the direct-acting type.





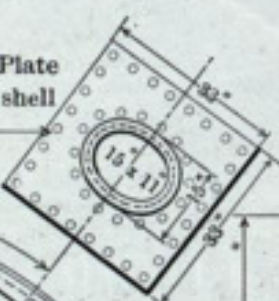
ENGINES AND BOILERS OF STEAMERS MINNETONKA AND MINNEWASKA BUILT ON THE LAKES FOR OCEAN SERVICE.



Steel Castings for one Boiler

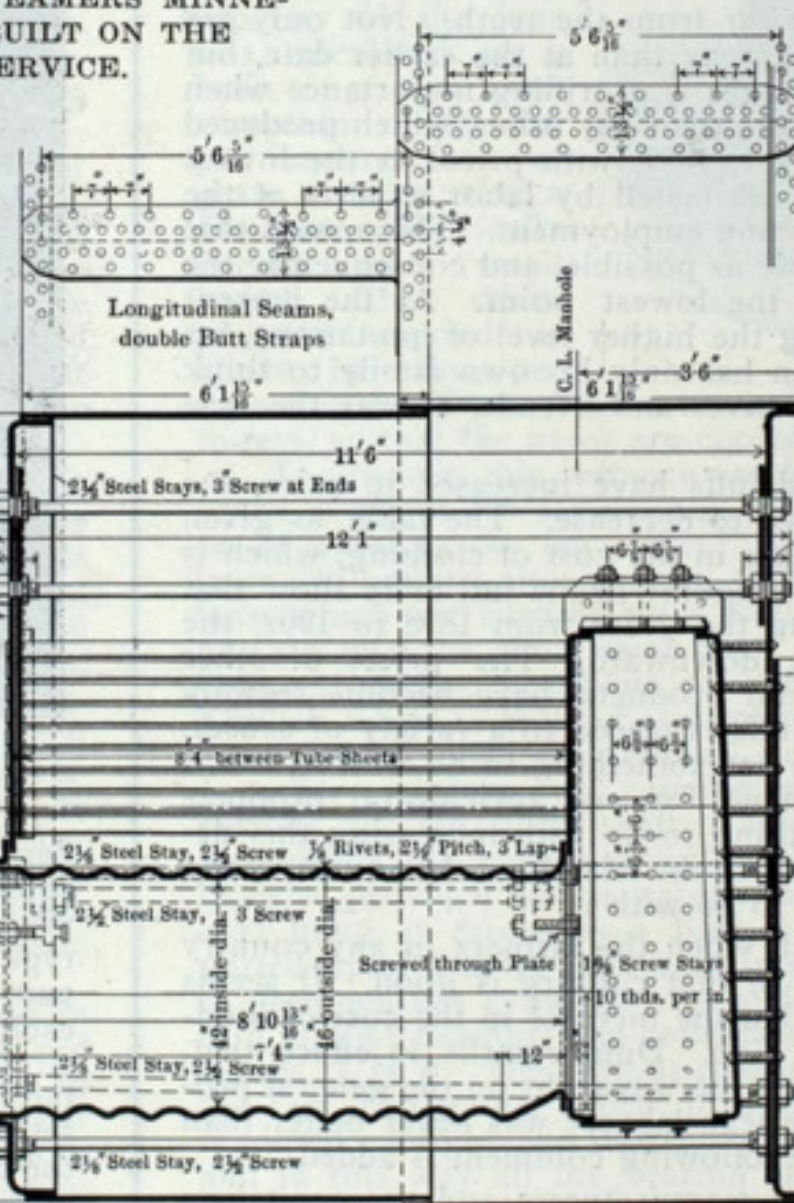
Manhole Doubling Plate  
1 thick on inside of shell

1 1/2 Rivets

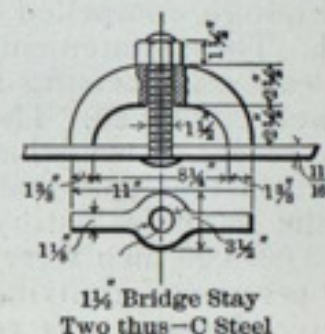


Front Plate not exposed to flame

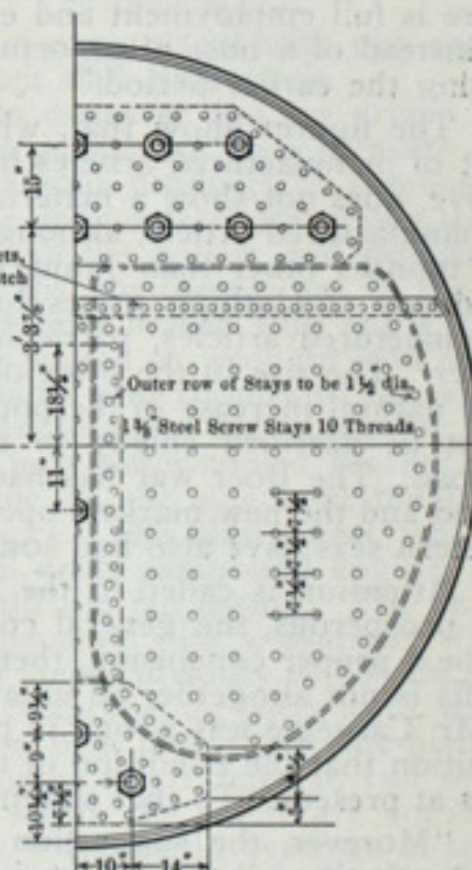
12'-0" mean dia.



MARINE REVIEW

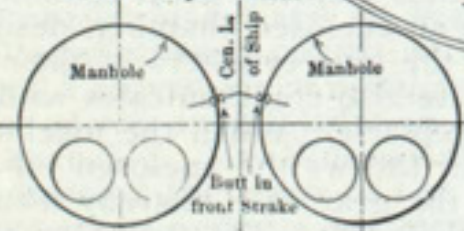


1 1/2 Bridge Stay  
Two thus—C Steel



MARINE REVIEW

Boilers in pairs thus:



The air pump is of the vertical single-acting type, driven from the low-pressure crosshead and fitted with bronze disc valves. Two feed and two bilge pumps are also driven from air pump crosshead, the feed pumps taking water from the hotwell and delivering to the feed heater, which is of Worthington type, from whence the feed water gravitates to the duplex vertical Blake main feed pumps, by which it is pumped to the boilers through an oil filter. The donkey and ballast pumps are Blake vertical duplex type, the latter being arranged so that it may be used as a circulating pump. The donkey boiler and evaporator feed pumps are horizontal duplex. The main steam pipe is of 9-in. lap-welded iron with riveted cast steel flanges, the connections to the four boilers being made of solid drawn copper tubing with suitable expansion bends and slip joints. Auxiliary steam and exhaust pipes are copper and bilge suction lead.

The main boilers are four in number, of the Scotch type, 12 ft. mean diameter by 11 ft. 6 in. long, with a working pressure of 170 lbs. per square inch. Each has two Morison interchangeable furnaces of 44 in. mean diameter with separate combustion chambers and 226 tubes of 3 in. diam-

eter. The total grate surface in the four boilers is 148 sq. ft., and the heating surface 6,900 sq. ft. The boilers are fitted with Howden draft, with a large single fan and belted engine. The donkey boiler, which will supply steam for the nine cargo winches, is of the Scotch type, 10 ft. 6 in. diameter by 10 ft. 6 in. long, with two 40-in. furnaces and 158 tubes of 3 1/4 in. diameter. It is placed above the main boilers on the upper deck and connected to the forward main funnel. Ashes are hoisted up stokehold ventilators by small double cylinder engines, buckets being transferred to chutes at ship's side on overhead trolleys.

The propeller is of cast iron, 18 ft. 6 in. diameter by 17 ft. pitch, with 94 sq. ft. of surface on four removable blades.

The engines are supplied with a very complete outfit of engineers' tools, etc., and spare gear in excess of Lloyds' requirements.

In view of the successful outcome of such a departure on the part of the American Ship Building Co. as the construction of large freighters for transatlantic service, Mr. A. C. Dierickx, chief of hull department, and Mr. A. P. Rankin, chief engineer, are of course very much pleased over these ships. Owners of the vessels have been represented during construction by Capt. F. D. Herriman of the Great Lakes Register. The Minnetonka will be commanded by Capt. Samuel Fowler, late of the Drumgarth, and the Minnewaska by Capt. Louis Leverage, late of the City of Everett.



### THE LABORER IS SHARING IN PROSPERITY.

Not long ago Andrew Carnegie said in an address: "It is one of the most cheering facts of our day that under present conditions the wages of labor tend to rise and the prices of the necessities of life tend to fall." When Mr. Carnegie's attention was called to the fact that statistics did not bear out his statement he qualified his utterance in this wise:

"When I spoke of the decreased cost of living 'in our day under present conditions,' I had no reference to the advance in prices during the past few years of this temporary 'boom.' This is to change when the 'boom' subsides. Contrast prices before that and the fall is seen. 'Our day' is our generation. In clothing, for instance, the fall is remarkable and in many other miscellaneous articles equally so."

The fact is that the cost of foodstuffs has materially increased, but it is equally true that the condition of the laborer in this country was never better than it is today. The capitalist is making money, but so is the laborer. This is shown in no better way than by figures compiled for the "Index Number" of Dun's Review. In compiling this "Index Number" the price of a unit of each commodity for a given month is multiplied by the annual per capita consumption, so that at any given date is shown at the price of that date, the cost per capita of a year's supplies of all the necessities of life. In a table recently published in the Review it was shown that the cost of living for 1901 was higher than the cost of living in any other recent year. A comparison of figures given below may be of interest. In explanation of the table it should be stated that the figures given represent the average cost per capita of any commodity mentioned for one year, at the price of the commodity on the date given. Here are the figures:

	Breadstuffs.	Meats.	Dairy and Garden.	Other Food.	Clothing.
1893, Jan. 1.....	\$15.75	\$9.31	\$15.29	\$9.59	\$13.90
1895, Jan. 1.....	14.31	8.35	12.19	8.60	11.88
1898, Jan. 1.....	13.51	7.33	12.37	8.31	11.57
1900, Jan. 1.....	13.25	7.25	13.70	9.20	17.48
1901, Jan. 1.....	14.48	8.40	15.55	9.50	16.02
1902, Jan. 1.....	20.00	9.67	15.24	8.95	15.54

"Breadstuffs" include wheat, corn, barley, oats, rye, beans and peas. "Meats" include live hogs, beef, sheep and many meat products, such as lard, tallow, etc. "Dairy and garden" include eggs and fruits, while "other foods" include fish, liquors, sugar, rice and tobacco. "Clothing" includes raw materials, silk, rubber goods, hides and leather. In commenting on the table, only a part of which is given above, the Review says:

"It is to be regretted that the compilation of prices here given has been quoted in support of efforts to stir up antagonism between wage earners and employers. In this connection the claim has been made that the remarkable advance in the cost of living since July 1, 1897, was due to combinations of capital, and that the manufacturer secured all the difference in price, while the wage earners were not earning any more money, although compelled to pay the advanced quotations for all things consumed. These statements are very far from the truth. Not only are the wage earners receiving much better pay than at the earlier date, but they are well employed. The rate of wages is of trifling importance when there is no work. It was this factor, more than any other, which produced the depression that culminated on July 1, 1897, with prices at the lowest point in the nation's history. It was estimated by labor experts at the time that 3,000,000 men were unable to find employment. This means that 15,000,000 persons were living on as little as possible, and consequently the consumptive demand was reduced to the lowest point. At the present time there is little difficulty in meeting the higher level of quotations, for there is full employment and each man has only his own family to think of instead of a host of unfortunate relatives and friends, as was the case during the earlier period."

The figures show that, while foodstuffs have increased in price, the cost of manufactured articles has tended to decrease. The table, as given above, does not show a material decrease in the cost of clothing, which is a manufactured article, although Dun's figures in the full table show that for months other than January, during the years from 1898 to 1902, the tendency of clothing prices has been downward. The prices of other manufactured articles, particularly metal products, have become steadily lower. The rise in the price of foodstuffs is traced to a variety of causes. The natural increase in the population has something to do with it, but it must be ascribed chiefly to the demand for our agricultural products abroad. The Boer war has had something to do with increasing this demand and the new markets opened to us in the islands of the southern and western seas have also had something to do with it.

Attention is called to the fact that, when the farmers in any country are prosperous, the general condition of that country is good. It seems to be a proper conclusion, therefore, that the increase in the cost of foodstuffs is not altogether an unfavorable sign. Dun remarks, in effect, that, if Mr. Carnegie was wrong in particulars, he was right on the general proposition that the condition of the American laborer was never better than it is at present. To that statement the following comment is added:

"Moreover, the suggestion that the manufacturers and the capitalists are pocketing all the profits is equally open to contradiction. These are not the men who have advanced the number of deposits in savings banks to the highest point on record, nor increased the life insurance policies to present phenomenal figures. Examination shows that the farming population receives the greatest share of enhanced prices, the rise in breadstuffs falling little short of 90 per cent., while meats rose nearly 30 per cent., and dairy garden products 75 per cent. Much of the latter gain is due to the change in season, as eggs, milk, etc., are all more expensive in winter than in midsummer, but this factor enters into the record and cannot be ignored. Coming to the manufactured products, there is a sudden fall in the percentage of gain, the clothing class rising but 11 per cent. This does not indorse the statement that the manufacturers are securing all the advanced cost of living. In fact analysis of the clothing quotations in detail makes the showing still less favorable for the manufacturer. Comparing the prices of a few of the principal products of manufacture and the raw material in each case, it appears that the advance in the finished article has not by any means been commensurate with the rise in material. For instance, hides are 49.5 per cent. higher than on Jan. 1, 1888, while leather, the partially manufactured product, is 4.3 per cent. higher, but boots and shoes are actually 8.3 per cent. lower in cost to the consumer than at the

earlier date. Woolens, alone, show a slightly higher percentage than the material, which is due to the peculiar depression recently felt in the wool market. Despite the marvelous demand for iron and steel products and the existence of the most complete industrial combination that ever existed, there appears a rise of but 35 per cent. in that class, while in the miscellaneous division there is a gain of 37 per cent. over July 1, 1897, chiefly due to lumber and building materials. As the laboring man does not as a rule own his home, the greater cost of structural products is not a disturbing element to him. On the other hand, the wage earner benefits by lower rents and better accommodations, which have followed the increase of money-seeking investment and consequent fall in interest rates. Capitalists who formerly received 7 per cent. or more on their properties are now glad to take 4 or 5. These facts cannot be considered evidence that the few have reaped all the benefits of the marvelous advance of prices at the expense of the many."

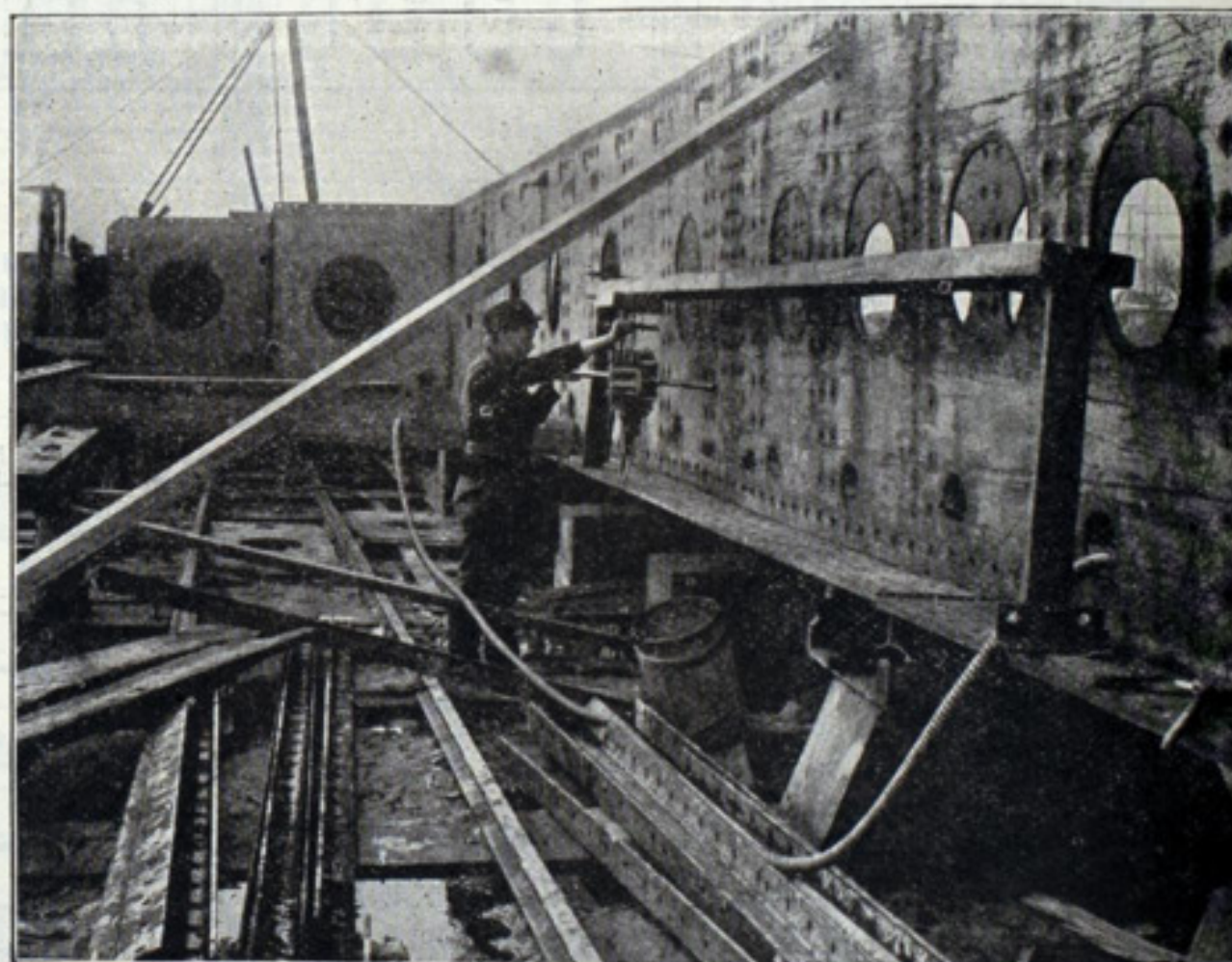
### VARIED USES OF PNEUMATIC TOOLS.

It is undoubtedly true that the adoption of the pneumatic tool has greatly lessened the cost and lightened the labor of ship building; not on steel vessels alone but in all kinds of ship yard work. A Pacific coast ship builder, writing to the Marine Review regarding the use of these tools in building wooden vessels, says:

"We estimate that with each of the pneumatic tools which we have in operation we save the labor of twelve men per day. We not only do the boring with these machines, but drive the trenails and bolts requisite in the construction of a wooden vessel, which reduces the labor on a vessel, say of 1,200 tons gross tonnage, one-third."

It would be impossible without the aid of these ingenious and labor-saving appliances to turn out steel ships with the rapidity with which they are at present being turned out in the United States. They are now used in almost every line of work involved in hull construction. Time is today the most valuable of all assets, and regarded from that standpoint the pneumatic tool is priceless. Its adaptability to structural work is infinite.

Referring to their line of tools the Standard Pneumatic Tool Co. of Aurora, Ill., submit the accompanying illustration, showing a man with "Little Giant" drill No. 0 drilling heavy plate in a large vessel under construction. They say: "Qualities which a portable pneumatic tool should possess include economy in the use of air, lightness, freedom from vibration, simplicity and durability of construction, and excellence of workmanship. We are quite sure that these qualities are possessed in a very high



DRILLING HEAVY PLATE IN SHIP CONSTRUCTION.

degree in our "Little Giant" tools. Our hammers are particularly adapted to ship yard use. They are unexcelled for all classes of riveting, chipping, calking, beading, etc. Our "Little Giant" drills are of the piston type and consist of four single-acting cylinders, arranged in pairs, each pair of pistons being connected to opposite wrists of a double crank-shaft; each piston of each pair traveling in opposite directions at all parts of the stroke, thus insuring a smooth running machine. All parts are made interchangeable. The machines are provided with balanced piston valves, set to cut off at five-eighths of the stroke, thus insuring great economy in the use of air. The crank-shaft revolves in an enclosed chamber, designed to be kept partly filled with oil. Each of the four cylinders at their rear ends into this compartment and the gear-case also communicates with and forms a portion of this chamber or oil receptacle. When the machine is in use the rapid rotation of the crank-shaft throws the enclosed oil over the parts located in this chamber, and in the gear case, thereby insuring perfect and continuous lubrication of all the parts. The thrust or strain in drilling is not borne by the main frame of the machine, but is passed directly from the drill to the screw-feed by means of a spindle bearing on a fixed post, upon which the screw-feed is mounted. The spindles are provided with standard Morse taper sockets and threaded externally at their lower ends, so as to receive chucks and other special devices."

The Standard company manufactures air drills, hammers, reversible flue rolling, reaming, tapping and wood boring machines, motor chain hoists and pneumatic tools and appliances of every description.

The windlass for the yacht which the Townsend & Downey Ship Building & Repair Co., Shooter's island, N. Y., is building for the Emperor of Germany, will be of the Providence kind, made by the American Ship Windlass Co. of Providence, R. I., and well known all over the world. It is understood that the Providence company is taking more than ordinary pains to make this windlass as nearly perfect as possible.



### A GREAT ATLANTIC STEAMSHIP PROJECT.

Several weeks ago the Yachting World of London published a communication from George Wilson of 55 Broadway, New York, telling of a great American corporation (the New York & European Steamship Co.), which is to build for the Atlantic trade ships of 700 ft. length and 70,000 H.P., driven by "American turbine" engines, using Texas oil for fuel, etc. The scheme seemed so visionary that little attention was given to the communication in the London publication, but as the New York Sun has since hunted up Mr. Wilson and learned some of the details of his great record-breaking ocean liners, the letter to London as well as the interview in the Sun are reprinted for what they are worth. In his letter to the London Yachting World Mr. Wilson said:

"Last summer you published a special number, containing an article on 'Steam Turbines for Yachts.' It may interest you to know that we are arranging to build six passenger and mail steamers, each 705 ft. long by 70 ft. beam by 29 ft. draught, 70,000 H.P., to be driven with the American turbine, Texas oil fuel, and deliver passengers and mails from New York both to London and to Paris in four and a half days, postoffice to postoffice, and to Berlin in five and an eighth day; to average 30 knots across the Atlantic. The consumption of oil (crude Texas petroleum) will average under three-quarters of a pound per horse power per hour—including auxiliary powers aboard. These vessels will have six propeller shafts, so as to keep down the power to be transmitted on each shaft below the 12,000 H.P. per shaft, ten screw propellers, viz., two on each of the four side shafts and one on each of the two central shafts. All the propellers will be fitted with quick reversing gear, to reverse without stopping the turbines, and so arranged that they may go ahead, astern or act as a drag as desired, the turbine running full speed or standing still. With these reversing appliances, if the rudder or other part of the steering gear breaks at sea, the ship can be readily steered from the bridge with one of the propeller shafts and leave the others to drive the ship, so that it would reach port with very little loss of time. By reason of the six shafts and ten screws a breakage of any one or two of them is comparative unimportant—the ship will arrive with little delay."

Following up the foregoing communication, the New York Sun publishes the following as a result of an interview with Mr. Wilson:

"Mr. Wilson is a Scotchman, a native of Glasgow, and has been at work for several years, first with the general idea of producing a rotary engine and latterly with the distinct aim of an effective turbine to devise a high-speed and high-power engine for driving ships. When Mr. Parsons' invention of the turbine, of which so much has been heard of recent years, was given to the world, it struck Mr. Wilson as the equivalent of a quadruple reciprocating engine with several defects. These he set himself about to remove and at the same time he devoted himself to an effort to produce a steam turbine which should be practicable for installation in ships and which could drive vessels at higher speed than any that now traverse the seas. He began his work in Great Britain, but it was not until the discovery of the Beaumont oil gushers, recently, that he found himself able to lay out a practicable scheme for the utilization of his ideas. Although the letter to the Yachting World might suggest that the innovation of turbine steamships 700 ft. long for fast Atlantic service was a prospect of the immediate future, Mr. Wilson acknowledged that the projected ships had not yet even been contracted for, although estimates for their building had been asked and were in hand. Several reasons, he said, made it still a matter for consideration when and where the vessels should be built. The company, he said, was incorporated under the laws of Maine, and its first movement when the time and place of building the vessels was determined would be the construction of one ship of the kind described in his letter to the Yachting World, so that the ship might demonstrate its ability by the use of his turbine invention to cross the ocean in the time mentioned.

"Mr. Wilson was so confident of the ability of such a ship to do what he promised that no attempt had been made, he said, to induce existing lines to adopt the invention, the desire being to keep all the possibilities of profit to an independent company. He said positively that the capital was at command with which to build the first ship, although he declined to publish at the present time the names of his associates in the concern. He said further that two large American ship builders had requested permission to use his invention and that a very large electrical manufacturing concern of this country had asked for the right to its use for land engines. He said that one of the proposed record-breaking ocean giants to be driven by his turbine could be built, according to the estimates, for between \$2,000,000 and \$2,500,000, in perhaps eighteen months, the difference between these figures and the Deutschland's cost of nearly \$4,000,000, representing the cost of the Deutschland's engines over the Wilson turbine.

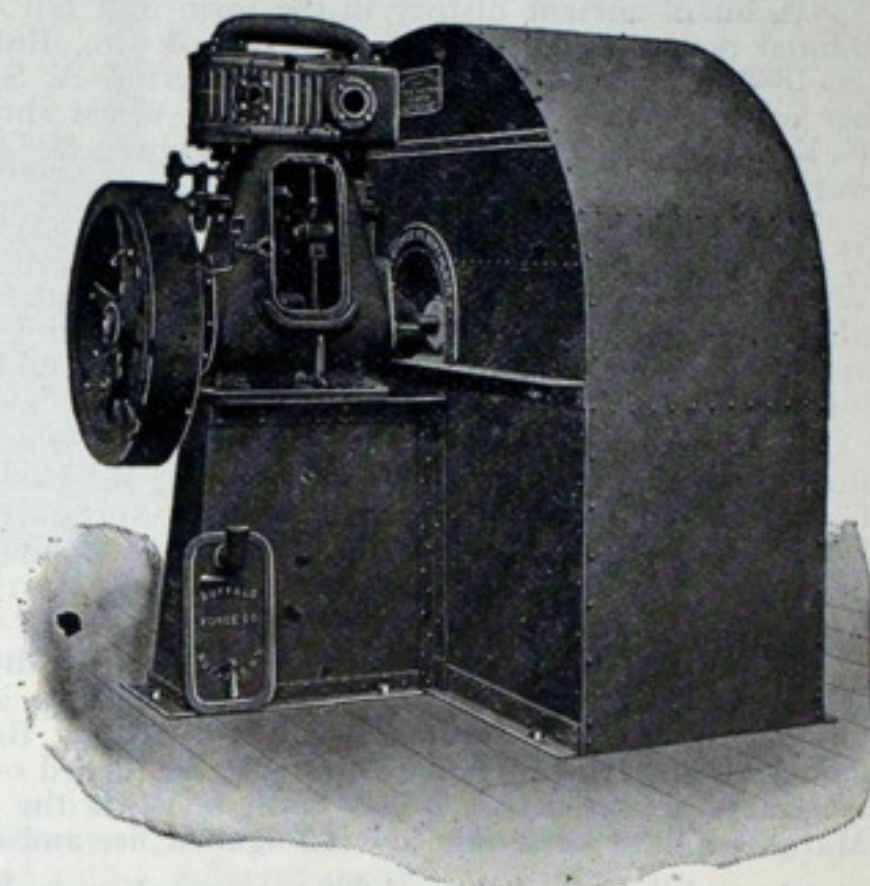
"Mr. Wilson exhibits a model of his invention at his office, and in explaining it draws attention to the difference in structure between it and the Parsons turbine. In the Parsons turbine the steam is admitted to the cylinder at one end, and plays against hundreds of small blades similar to propeller blades and set at angles in discs which make perhaps a thousand revolutions a minute, in the interval between every two discs being placed a curved bit of metal for reversing the steam which comes off one series of the small blades so as to direct it properly upon the blades of the next disc. Mr. Wilson holds that there is considerable loss of power in admitting the steam at one end of the cylinder, so that the last set of blades at the opposite end receive only a diminished thrust, and that there is a further loss at each reversal of the force of the steam between each pair of the discs or each two sets of the blades. He says also that by reason of the condensation of the steam and the settlement of the moisture at the bottom of the cylinder there is much water-friction after a time, which is material when the revolutions reach so high a number as a thousand a minute.

"His own invention is wholly different in design and in the method of applying the steam power. His turbine is a cylinder around the center of which runs a mid-feather or band set at right angles to the face of the cylinder; from this band there branch out on either side other bands also set perpendicular to the cylinder, which make with the mid-feather a continuous series of V's on either side of the mid-feather all around the center of the cylinder. A short distance from the mid-feather, at what would be the broad or open end of a long V, these radiate bands cease to be straight and continue in parallel zig-zag courses, with equal angles of about fifteen degrees, which courses are so designed that the bands reach

the ends of the cylinder after traversing half its circumference. The steam is let inside the casing, which incloses this cylinder, through several inlets opening at different points just over the mid-feather and, splitting on the mid-feather, the steam takes its way through the channels between the radiate bands, delivering its thrust upon each opposing arm of the zig-zag, and thence being shunted to the next or alternate one. The channels deliver it at the ends of the cylinder against cycloidal blades set on the cylinder ends, where it spends its last power and exhausts around the axle, the condensation being drained off below. Mr. Wilson says that this enables a direct as against an oblique thrust of the steam power, distributes the power equally to all parts of the turbine simultaneously, and obviates the loss by reversing and also that by water friction. He intends to put 140 of these channels on a 10-ft. cylinder, the diameter and length of the cylinder being equal. And this is the steam turbine with which he expects to equip the ships mentioned in his letter. He says that oil fuel is no longer an experiment in ocean vessels, that the Shell Transportation & Trading Co. of London is now operating its own ships with oil fuel and is establishing a line of oiling stations all around the world; that it has ordered six 12,000-ton ships, which it will operate with oil fuel; that among the oiling stations it has already established and is feeding, partly with Texas oil, are stations at Cape Town and Durban, and that the ships of the Union and Castle lines between London and Cape Town are run by oil. The Texas or Beaumont oil which he plans to use for its turbine ships, he says, is so economical a fuel in the sense of force yielded for bulk carried that four-sevenths of a ton of it does the work of one ton of coal. Mr. Wilson said that the plan of his company was to capture the passenger business by quick service and do little freight carrying."

### SPECIAL MECHANICAL INDUCED DRAFT FAN.

In the accompanying engraving is illustrated a special steam-driven steel-plate fan, designed for mechanical induced draft by the Buffalo Forge Co. of Buffalo, N. Y. Details of the construction of this apparatus present some interesting features. This direct-connected fan is one of two



similar pieces of apparatus which, together, form a duplex induced draft plant installed in a large electric power establishment of northern England. Each fan is capable of handling the gases from four Galway boilers, each 8 ft. 6 in. in diameter and 28 ft. long with a grate area of 48 sq. ft. The capacity of the fans was calculated on a basis of a coal consumption of 20 lbs. per square foot of grate surface, using a Durham coal, locally known as "small bean." The steam pressure carried is about 140 lbs. per square inch. These boilers are arranged in conjunction with two economizers, so that the gases are cooled to about 450° Fahrenheit.

The fans in this instance are 100 in. in diameter and are driven at a speed of about 400 revolutions per minute, equivalent to a pressure of 2 in. of water at the fan outlet. All the gaseous products of combustion from the boilers, after passing through the economizer, are drawn to the fans, which are situated on a platform above the boilers and discharged upward into the short steel stack. The fans themselves are of the full housing, upblast steel-plate construction, rigidly braced with angle irons. The fan wheel is built of steel-plate blades bolted to wrought-iron spider arms and provided with conical side pieces to lend rigidity to the whole. In order to insure cool running while handling the hot gases for long periods, the fan wheel shaft is supported in a water-cooled bearing, and in addition the main bearing of the engine on the side next the fan is likewise provided with a water-cooling device. The blast wheel, which is over hung, is driven by a Buffalo vertical cross-compound engine, supported upon a sheet steel base integral with the fan casing. The engine as designed has cylinders of 4 and 6 in. diameter with a common stroke of 5 in. and running non-condensing on a steam pressure of 130 lbs., develops 17 H.P. The various rotating and reciprocating parts work within the cast iron frame, which, by the addition of a removable side-plate, is rendered oil-tight and dust-proof. The engine is arranged to run in oil, and in this way all the bearing surfaces within the frame are copiously supplied with a lubricant. The crank shaft is carried in bearings of ample length affixed to the frame. The low-pressure cylinder is fitted with a slide valve, driven from a fixed eccentric on the crank shaft within the bed, and hence its cut-off is fixed. Steam distribution in the high-pressure cylinder, however, is controlled by a balanced and adjustable piston valve which is itself actuated by the swinging eccentric of a sensitive shaft governor. In this way the fan is maintained at a uniform speed when serving one or all of the boilers without any alteration in the position of the dampers.

Excellent steam economy is attained for an engine of this size, and by the automatic oiling arrangement frictional losses are reduced to a minimum. The feature of tightly enclosing the engine will be appreciated when the environment in which the engine operates is recalled. The many advantages resulting from the application of induced draft to boiler plants cannot be dwelt upon here, but it may be well to note the marked saving effected by such apparatus, in that the lowest grades of fuel may be burned with facility.

Rails of the Cape Breton Railway Co.'s proposed line between Sydney and St. Peter's and between Sydney and Louisburg will be provided by the Dominion Iron & Steel Co., Sydney, C. B.



## AROUND THE GREAT LAKES.

Mr. J. W. Conrad of Toledo has been appointed general agent of the White Star line.

Capt. H. F. Loftus, who was in the steamer H. E. Packer last season, will sail the steamer W. W. Brown, which will be launched at South Chicago Saturday. Capt. John F. Ivers, who was in the David M. Whitney will sail the steamer Admiral.

The Tunnel City Boiler Works of Port Huron is making repairs costing about \$2,000 to the boiler of the steamer Tempest, owned by Thos. Lester and others of Marine City. The Tempest will be otherwise repaired, to put her in first-class shape for another season's business.

Capt. J. H. Buchanan of Erie has been appointed assistant superintendent for the Pittsburgh Steamship Co. He will be located in Cleveland. Capt. Buchanan, who is a young man, was master of the barge Magna last season and laid up a number of the consorts of the Pittsburgh company's fleet last fall.

As in other branches of the lake trade, the insurance companies are figuring on establishing their business for the coming season on last year's basis. It is now deemed certain that there will be no change to speak of in rates or policies on standard steel and wooden ships. If there is a change at all it will be in the form of higher rates on low-grade vessels.

The steamer Kennebec and her sister ship, Kahwana, the latter building at the yard of the Jenks Ship Building Co. at Port Huron, have been engaged for the ore trade between Escanaba and South Chicago during the coming season. These vessels are owned by F. B. Chesbrough of Emerson, Mich. They have been chartered by the Iroquois Furnace Co.

Two freighters will be launched at lake yards Saturday. The steamer W. H. Gratwick, building for the Etna Steamship Co., of which Capt. John Mitchell is manager, will go into the water at the Cleveland yard of the American Ship Building Co. and the steamer W. W. Brown, named for the manager of the United States Transportation Co., will be launched at South Chicago.

A bit of ancient history in the form of a bill of lading has been exhibited recently in the office of Brown & Co., Buffalo. It is dated Oct. 28, 1863. The vessel is the barque Superior, A. S. Gotham, master, and her cargo consisted of 19,500 bushels of wheat shipped from Chicago by E. K. Bruce and consigned to P. L. Sternberg & Co., Buffalo. The freight was "only" 10½ cents a bushel.

The steamer building at Detroit for the Franklin Transportation Co., of which Mr. D. R. Hanna of Cleveland is president, will be named for William F. Fitch, vice-president and general manager of the Duluth, South Shore & Atlantic Railway Co. The barge building for the same company at Buffalo will be named for Alexander Maitland, manager of the mines for the Republic Iron & Steel Co.

Officers of the Licensed Tugmen's Protective Association, elected at the annual convention in Cleveland during the past week, are: President, Capt. Charles McCarle, Chicago; first vice-president, M. J. Burns, Cleveland; second vice-president, C. J. Kitchen, Cheboygan; third vice-president, J. R. Cook, Sault Ste. Marie; secretary, Harry H. Vroman, Buffalo; treasurer, Charles Gagnon, Two Rivers.

The Milwaukee works of the American Ship Building Co. has quite a job in repairs to the steamers Muskegon and Pere Marquette No. 3, which stranded at the entrance to Ludington harbor. Both steamers are badly damaged, and the last named ship may be turned over to the underwriters as a total constructive loss. Until last fall the steamers of the Pere Marquette fleet were only insured against fire and collision.

A steel lighter of about 1,300 tons capacity, with revolving derrick and other equipment for wrecking purposes, will be built for the Great Lakes Towing Co. by the Jenks Ship Building Co. of Port Huron at a cost of about \$40,000. The Great Lakes company has about completed arrangements for the purchase of the wreckers Favorite and Saginaw and will next season be practically in control of wrecking business on the lakes.

Invitations have just been issued by the Bertram Engine Works Co., Ltd., of Toronto to the launching of the Richelieu & Ontario Navigation Co.'s passenger steamer Montreal, which will take place Feb. 3 at 3 p. m. The Montreal will be the finest side-wheel steamer in the Lake Ontario-St. Lawrence trade. A banquet to be given by the Bertram company to officers and directors of the navigation company at Conkey's, Toronto, will follow the launching.

In the death of Ernest Victor Clergue the family suffers its first break by death since it came to America and settled at Bangor, Me. He was born at Bangor, March 20, 1858, and for the past seven years had been identified with his brothers, Francis H. and Bertrand J., in the development of the Clergue associated industries at the Sault. Ernest Clergue was especially identified with the Helen mine at Michipicoten and the consequent construction of the Algoma Central railway to reach it. He went to Chicago for treatment for heart trouble three weeks before his death. The funeral was held at Bangor.

Transfers of vessel property: Steamer P. J. Ralph and consort Harold, Chas. Beyschlag of St. Clair to Calbie Transportation Co. of Chicago, Capt. James A. Calbie, manager; steamer J. D. Marshall, J. C. Perene of South Haven to A. C. Wanwig and others of Chicago; steamer Hennepin, public sale, to Capt. Davis of David Vance & Co., Milwaukee, \$18,100; barge W. G. Perry to Pittsburgh Coal Co. of Cleveland, to be used as a lighter in Cleveland harbor; steamer B. W. Blanchard, A. A. Parker of Detroit to C. W. Kotcher of Kotcher Lumber Co.; steamer Mark Hopkins (ashore near Long point, Lake Erie), O. W. Blodgett and underwriters to H. W. Baker, wrecking master, of Detroit, \$8,500.

Corrigan, McKinnie & Co. of Cleveland has secured control of another property on the Mesabi range, the Phenix. The fee is owned by Herman Sibley of Rochester, N. Y., and the lease was owned by the Phenix Mountain Iron Co., of which A. C. Hubbell and Thomas A. Merritt were the principals. The lease was sold by them to Corrigan, McKinnie & Co. for a bonus of about \$110,000, and the royalty is 20 cents. The minimum of output for this year is said to be about 50,000 tons and each year thereafter 100,000 tons. Messrs. Merritt and Hubbell have held the lease since last May and have shown up a deposit of about 3,000,000 tons of good Bessemer ore. The Phenix property is situated a few miles east of Hibbing.

## FIVE-MASTED SCHOONER PRESCOTT PALMER.

The New England Ship Building Co., Bath, Me., launched the five-masted wooden schooner Prescott Palmer last week. She is of the same general type of the other schooners of the Palmer fleet and is of the following dimensions: Length, 288 ft.; beam, 46.2 ft.; depth of hold, 27.2 ft.; gross tonnage, 2,811. The most marked peculiarity of the Prescott Palmer's construction is the introduction of steel belts which strap the vessel from stem to stern. While this is not a new feature in marine construction, it is new in schooner construction on the Atlantic seaboard and the builders of this vessel believe she is the most heavily and closely strapped vessel ever built. Extending from one end of the vessel to the other, and along the gunwale, is a belt of steel 8½ in. wide and ¾ of an inch thick, which serves the purpose of the sheer-strake in the steel vessel. Beside this belt there are 164 other straps which run diagonally from keel to gunwale. These are bolted at every intersection, and to every frame which they cross and to the belt-strap. It is claimed that by this method of construction a vessel so equipped will be stiffer and stronger in a sea-way, and will be in less danger of severe injury should she at any time be driven ashore or run on a reef. The diagonal straps will prevent the danger of hogging, forming, as they do, trusses throughout the vessel's frame. The system and method of this iron trusswork are what gives the vessel the right to be classed as a "semi-composite" craft. The Prescott Palmer has three decks, with a flush maindeck, which insures greater safety for the crew in handling the vessel and in all ways is the best design. The five masts of Oregon pine are each 118 ft. high, and the topmasts are 62 ft. more. The spanker boom is a splendid long and slender stick, being 82 ft. in length; the other booms are each 46 ft. long. With such sail fixtures the schooner will spread over 11,000 yards of canvas, and will make a stunning figure on the water when all the kites are set and drawing.

The provision for the officers and crew is of the usual Palmer palaciousness, the cabin being finished with quartered oak and mahogany panels throughout. The forecabin contains accommodations for eight men, and is light and comfortable. The midship house contains the galley, mess room, quarters for the second officer, and has the latest novelty in an ocean-going ship—a large refrigerator capable of containing enough fresh supplies for a long voyage, with a plentiful supply of ice, which is taken in through a hatch in the main deck, and thereby makes life on board a Palmer much better than in the ordinary run of schooners. The fresh water tanks hold 8,000 gallons, and the vessel has an equipment of four Warren pumps. The engines are two in number of the link-motion, reversible type, one being forward for handling the cable, and the other at the after hatch for handling cargo, as well as for duty in making sail. These engines are of great service on such a heavily sparred vessel, doing the work of many men.

The chain cables are of 2¾ in. iron, and the anchors are of the usual number and type for such a vessel. The standing rigging is of the very heaviest sizes, and the running rigging is of the best Plymouth cordage. The vessel was designed by Mr. Palmer himself, who is accustomed to make the plans and drawings for all the vessels in his fleet.

The next vessel in the Palmer fleet to be launched will be called the Paul Palmer, and will also be a semi-composite craft, not so large as the Prescott Palmer; she is now about half built in the yard of Hon. George L. Welt at Waldoboro, Me., where the Fannie and Baker of the same fleet were built.

## LAKE CARRIERS' ASSOCIATION.

At a meeting of the executive committee of the Lake Carriers' Association in Cleveland, Wednesday, an advance of 10 per cent. was made in the salaries of shipping masters. The salary of Capt. George P. McKay, who is treasurer and also chairman of the committee on aids to navigation, which was \$1,800, was made \$2,400. Capt. McKay devotes all his time to the work of the association. Counsel Harvey D. Goulder's salary was advanced from \$1,500 to \$2,500 and Chief Shipping Master A. R. Rumsey was given an advance of \$200, making his salary \$2,400. During the coming season shipping offices will be maintained at Cleveland, Chicago, Toledo, Buffalo, Ashtabula, Milwaukee, South Chicago and Conneaut.

It was decided to admit Canadian tonnage to membership in the association and Capt. McKay was instructed to take the matter up with all owners of Canadian vessels on the lakes.

A communication from Major D. C. Kingman, United States engineer at Cleveland, relative to rules and regulations to govern the opening of drawbridges over the Cuyahoga river, was referred to a committee consisting of Captains L. H. Weeks, W. W. Smith, George P. McKay and Edward Morton, who will confer with Major Kingman.

Mr. Harvey L. Brown, the new secretary of the association, attended this meeting of the executive committee.

Appointments of Lake Carriers' Shipping Masters are: A. R. Rumsey, chief shipping master, Cleveland; William Wall, assistant, Cleveland; J. W. Hansom, chief shipping master, Chicago; Gordon Ratteray, assistant, Chicago; L. T. Rumsey, South Chicago; William Jamson, Milwaukee; Edward Nesbitt, Buffalo; Charles Fisher, Conneaut; William Dibble, Ashtabula; Patrick Mitchell, Toledo.

With several important repair jobs in hand at the works of the Ship Owners' Dry Dock Co., Chicago, and with more in sight, this company is assured of a very active condition of business throughout the winter. The steel steamer Tuscarora is in dock for a new wheel and is to have ten or twelve plates and several frames renewed. The Appomattox is to undergo extensive repairs and the J. H. Prentice is being calked and thoroughly gone over. The steamer City of Venice is also down for recalking. Mr. W. W. Watterson, superintendent of this yard, was elected second vice-president of the Dry Dock Association of the great lakes at the recent annual meeting of the association in Cleveland.

The Engel & Fagersten Chemical Co. of Chicago, manufacturers of Neptune anti-fouling compound, received a few days ago a trial order for their boiler compound from the German government and an order also from Central America.

For navigation charts apply to the Marine Review.



## LEWIS NIXON'S ENDORSEMENT OF SUBMARINES.

Lewis Nixon, ex-naval constructor, ship builder and political leader in New York city, is enthusiastic in his praise of the Holland type of submarine boat. In a magazine article of recent date he says:

"I have no hesitation in saying that the Holland boat, as adopted by the United States, and recently adopted also by Great Britain, is vastly superior to the several efforts of the French government and superior also to any other craft of its kind so far devised. Thus, the inventive ingenuity of our own land has another highly important attainment to its credit. There is not the slightest doubt that, in future warfare on the seas, submarine boats will play a very prominent part. In the system of naval tactics which has been evolved by hundreds of years of sea fighting, these small, inconspicuous boats will bring about changes which will be almost revolutionary. The blockading of ports, as practiced under our present system, will be well-nigh impossible. The immensely wealthy seacoast cities, which have trembled at rumors of war because of the likelihood that an enemy would steal up to their doors and destroy them, may put aside their fears. A few submarine boats will be able to clear any harbor of attacking ships of war. Against the stealthy and underhand, but terrifically destructive assault of such a craft, a battleship can have no defense but flight. At Santiago, for example, our men-of-war would never have dared to close in around the mouth of the harbor, if the Spaniards had had three or four vessels like the Holland scurrying about and delivering quick and unforeseen blows from the depths of the ocean. A battleship cannot attack one of these naval sharks, for the very simple reason that it presents no target. Be the lookouts ever so vigilant, they cannot, of course, detect an enemy approaching beneath the surface to attack from a water ambush. No armor plate that has ever been devised is as efficient as a score or more feet of water. Ordinary torpedo nets will give no protection against submarine attack; the assailants will be able to dive under these nets, or send through them a torpedo which will tear a hole large enough to enable the boat itself to pass. I think it is not putting it too strongly to say that, in a harbor protected by submarine boats, blockading, as practiced under the present system, will be a thing of the past. I believe that it will be necessary to devise some type of war vessel to withstand these boats. What type this will be no man can yet say. The vital feature of the new boats is, of course, their ability to move and fight under water. Many inventors have spent long years in endeavoring to devise means to accomplish this purpose; but, with the notable exception of John P. Holland, they have failed.

"I have heard talk of naval warfare beneath the sea—that is, of one submarine boat fighting another—but it is nonsense. While very powerful search-lights have been invented, none is strong enough to extend the area of vision more than a few yards in front of a submarine craft when immersed. A battle between such vessels would be a case of the blind fighting the blind. Much doubt has been expressed as to the seaworthiness of the Holland and her companions. As a matter of fact, there is no craft more seaworthy. When in fighting trim—that is, when nothing but the turrets are above the water—the boat lies in the water like a log, free from exposure to wind and but little influenced by the waves. Such craft will cross the ocean some day."

## MATERIAL PROGRESS OF THE UNITED STATES.

"The progress of the United States in its Material Industries" is the title of a monograph issued by the treasury bureau of statistics, which contains a series of statements showing the rapid development during the century of the important factors in the present prosperity of the country. These tables, which occupy a number of closely printed pages, show the development in products of the field, forest, mine, and manufactory, the growth in our population, wealth and commerce, the extension of railways, telegraphs and other methods of communication and transportation, and present an interesting and instructive picture of the progress of the United States and its people during the period from 1800 to 1901. Among the interesting facts presented by these tables are the growth of production, the growth of commerce, the growth of wealth, the growth of money in circulation, the growth of deposits in savings banks and the increased number of depositors in savings and other banks, the decrease in interest on the public debt, and many other facts of this character. On the production side, it may be said that the cotton produced has increased from 155,556 bales in 1800 to 9,436,416 bales in 1900; the wool produce, from 35,802,114 lbs. in 1840 to 302,502,328 lbs. in 1901; wheat, from 151,999,906 bushels in 1866 to 522,229,505 bushels in 1900; corn, from 867,946,295 bushels in 1866 to 2,105,102,516 bushels in 1900; copper, from 650 tons in 1850 to 270,588 tons in 1900; pig iron, from 165,000 tons in 1830 to 15,800,000 tons in 1901; petroleum, from 21,000,000 gallons in 1860 to 2,661,233,568 gallons in 1900; coal, from 3,358,899 tons in 1850 to 267,850,000 tons in 1901; and gold, from \$50,000,000 in 1850 to \$79,171,000 in 1900. During the period under consideration exports of merchandise have grown from \$70,971,780 in 1800 to \$1,487,764,991 in 1901; the per capita in 1800 being \$13.37 and in 1901, \$18.81. The imports of merchandise have grown from \$91,252,768 in 1800 to \$823,172,165 in 1901, while the per capita imports have fallen from \$17.19 in 1800 to \$10.58 in 1901.

Turning to the figures which show the net results of these developments, those relating to wealth, circulation, deposits, etc., the tables show that the wealth has increased from \$7,135,780,000 in 1850 to an estimated \$94,300,000,000 in 1900; the per capita wealth, from \$307.69 in 1850 to \$1,235.86 in 1900. The public debt, less cash in the treasury, was, in 1865, \$76.98 per capita, and in 1901 \$13.44 per capita; while the interest on the public debt which in 1867 was \$143,781,592, had fallen to \$32,342,797 in 1901. The figures of money in circulation show, in 1860, a total of \$435,407,252; in 1901, \$2,175,387,277. The circulation per capita in 1860 was \$13.85; in 1901, \$28.02. The deposits in savings banks in 1830 were \$6,973,304; in 1883, fifty-three years later, they were \$1,024,856,787, and by 1901, a further period of only eighteen years, had reached \$2,597,094,580. Meantime the national banking system had come into operation, and in 1865 the deposits in national banks were \$500,910,873; in 1880, \$1,006,452,853; in 1901, \$3,044,600,000. The number of depositors in savings banks grew from 38,085 in 1830 to 1,067,061 in 1866, and 6,358,723 in 1901. Railways grew from 9,021 miles in 1850 to 199,378 in 1901; and freight carried one mile increased from 39,302,209,249 tons in 1882 to 141,162,109,413 tons in 1900, freight rates falling meantime from 1.24 cents per ton per mile to 75/100 of one cent per ton per mile.

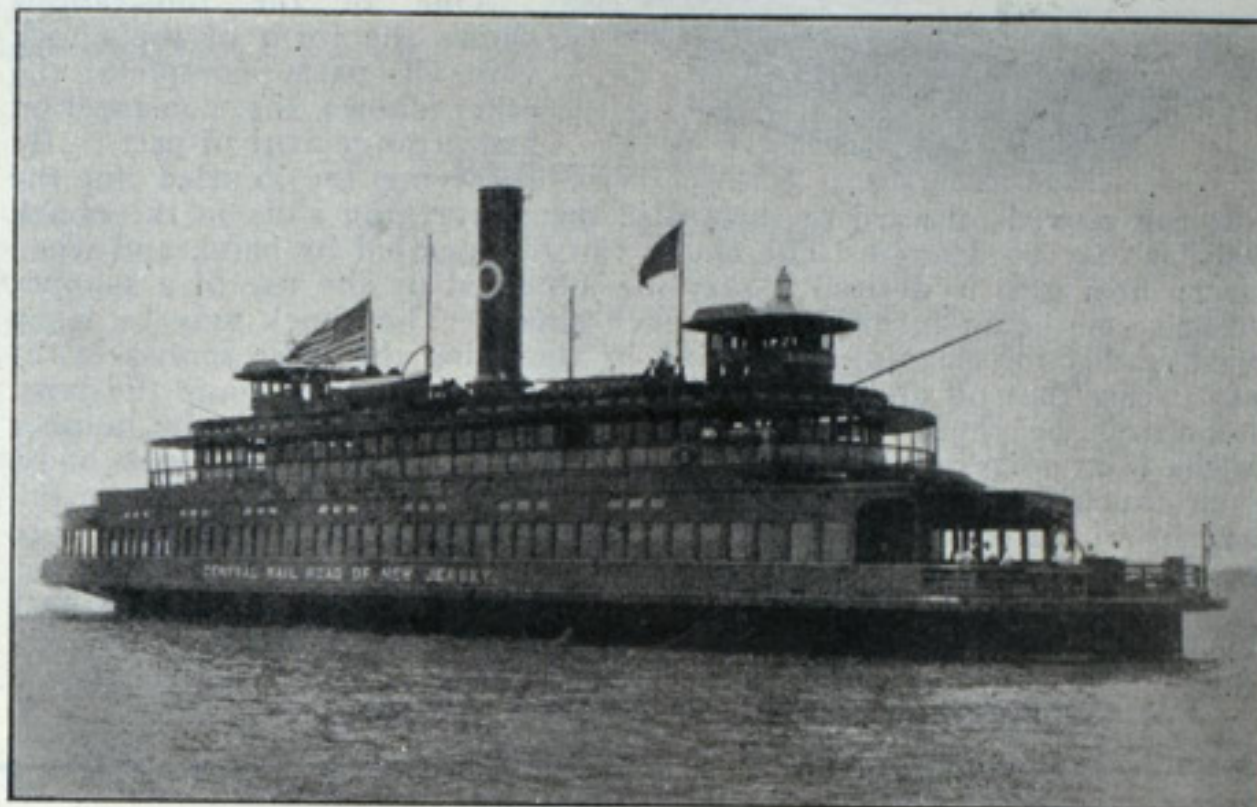
## PRINCE HENRY WILL MEET GREAT MEN.

Prince Henry has accepted an invitation to meet on his visit here 100 of the great business men of the country. The invitation was tendered through the German ambassador and is as follows:

"Believing that his Royal Highness, Prince Henry of Prussia, would be pleased to meet men prominently connected with the commerce and industry of the United States, an invitation has been extended to Prince Henry for a luncheon at Sherry's on Feb. 26, 1902, to meet 100 representative men identified with such business interests, which invitation has been accepted through the German ambassador at Washington. The gentlemen giving the luncheon are as follows: Morris K. Jesup, Edward D. Adams, John Claflin, L. M. Goldberger, Alexander E. Orr, James Stillman, J. Pierpont Morgan, George F. Baker, Elbert H. Gary, Abram S. Hewitt, W. Rockefeller, W. K. Vanderbilt."

The luncheon will afford Prince Henry an opportunity of meeting personally the men who are at the head of the great industrial interests of the country. This is one of the objects of his visit. One of the hosts says:

"The list of men includes the heads of interests engaged in the international business, the management of which will necessarily exert an active influence in the formulation of treaties, the revision of tariffs, the direction of transportation and the control of financial corporations based upon international commerce and the investment of American capital in foreign countries. The persons to be chosen as representatives of the various interests are among the leaders of those who constitute, outside of political and legislative circles, the vital forces that direct and energize the progressive development of the national prosperity."



FERRY BOAT LAKEWOOD OF THE CENTRAL RAILROAD CO. OF N. J.  
Built by the Harlan & Hollingsworth Co., Wilmington, Del.

## TRADE NOTES.

Calendars issued by H. Bloomsburg & Co., Baltimore, Md., are very much out of the ordinary. Each month is mounted upon heavy card board and is illustrated with a different picture.

Alfred B. Sands & Son, 134 Beekman street, New York, have issued a tasty little calendar devoted to their marine specialties. It is illustrated with a picture of a yacht under full sail.

The Fort Wayne Electric Works, Fort Wayne, Ind., is issuing a monthly calendar this year. The issue for January is modeled in clay with a photographic inset of one of the company's type L. B. D. C. generators. The design is quite neat.

Officials of the Chicago Pneumatic Tool Co. report that since their reorganization orders for compressors, pneumatic tools and appliances, including cranes and hoists, received from the 1st to the 15th inst., equal the total December business, which was greater than that of any preceding month. The orders include one for eighty tools from the William Cramp & Sons company, ship builders of Philadelphia.

A booklet in the way of twenty-four advance pages of catalogue has just been issued by Marine Iron Works, Station A, Chicago, which they will send free on request. It contains much interesting reading matter, as also illustrations and details of the latest design of marine engines, all of value to those who may contemplate the purchase of such work. 2

## COMPAGNIE GÉNÉRALE TRANSATLANTIQUE

### FRENCH LINE—UNITED STATES AND EUROPEAN MAIL ROUTE.

New York to Paris in less than a week. New York to Havre-Paris every Thursday, 10 a. m.  
Company's own vestibuled train from Havre to Paris in four hours.

## FLEET 70 STEAMERS.

In New York service the following gigantic Twin Screw Steamers:

"LA LORRAINE" (new)	Twin Screw	15,000 tons	22,000 H.P.
"LA SAVOIE" (new)	"	"	"
"LA TOURAINE" (modern)	"	"	"
"L'AQUITAINE" (modern)	"	"	"

Naval officers command above steamers, insuring the same strict discipline as on a man-of-war. These ships all have double bottoms and water-tight compartments, and prescribed routes are taken to avoid fogs. The above steamers contain every modern twentieth century equipment for safety, most luxurious accommodations, and the cuisine is famous. The favorite route of the elite of both continents. For rates, plans and other particulars apply to

EUGENE DE BOCANDE, General Agent for United States and Canada, 32 Broadway, New York.

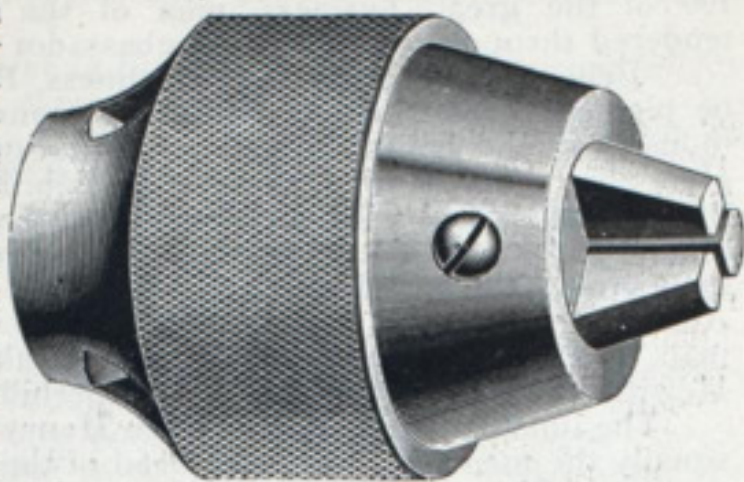
MAURICE W. KOZMINSKI, General Western Agent, 71 Dearborn St., CHICAGO.

OR TO LOCAL AGENTS.

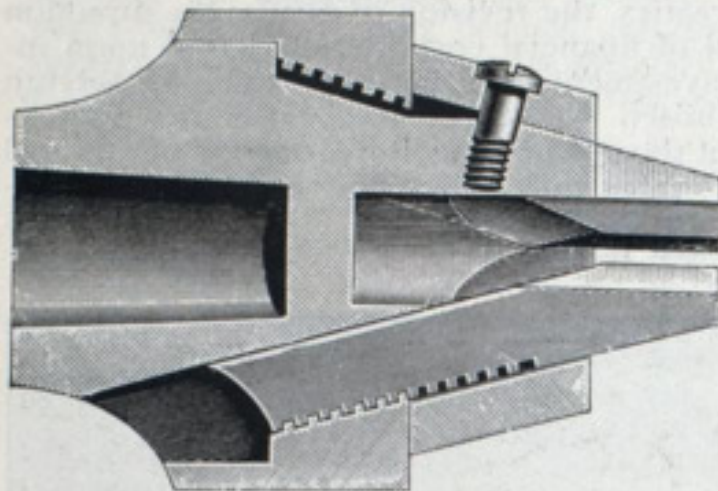


**SKINNER "NEW MODEL" DRILL CHUCK.**

The chuck shown herewith is what is known as the Skinner "new model" drill chuck. It is manufactured by the Skinner Chuck Co., New Britain, Conn. Sales of this chuck during the past year have run up into several thousands, and with a large increase in their output of lathe and planer chucks the Skinner company has found it necessary to increase the capacity of their works. They have more than doubled their floor space. All their buildings are modern, lighted by electricity and heated by steam, and are thus well adapted to the finest kind of machine work.



The "new model" drill chuck has met a demand for a well made and accurate device of its kind which could be sold at a low price. It is especially adapted for all light and rapid drilling, such as is done on "sensitive" drills and hand lathes, and where accuracy is required. The chuck is made entirely of steel, and of such grades as is best adapted to the different parts.



One of the illustrations shows the form of the chuck with all parts complete; the other shows the construction and arrangement of parts. By revolving the knurled nut the jaws are moved outward or inward in the converging slots in the chuck body as may be desired. The chuck can be operated by hand, and when a very firm grip is desired it may be obtained by the use of a spanner wrench, one being furnished with each chuck. The chuck may be taken apart readily for cleaning and oiling by removing the three screws in the cap, taking that off and revolving the nut enough to disengage the jaws. In putting the chuck together it is necessary to notice that the number on the jaws corresponds with the number of the slot in the chuck body. Each chuck is ground true after the jaws are hardened. A hole the full capacity of the chuck may be drilled through the center without injury to the chuck. Other styles and sizes of Skinner drill chucks will, of course, be made by the company as heretofore, the "new model" chuck in no way superseding them.

For navigation charts apply to the Marine Review.

Sealed proposals will be received at the office of the Light-House Engineer, Buffalo, N. Y., until 12 o'clock noon (standard time) of Friday the 28th day of February, 1902, and then opened, for constructing two beacons, one lantern and a fog-signal house, including foundations and protection work, in main south entrance of the new breakwater at Buffalo, N. Y., and one beacon on the south end of the New North Breakwater, main entrance to Buffalo Harbor, New York. Blank forms of proposal with specifications and plans, may be had on application to Major T. W. Symons, U. S. Engineer, Tenth Light-House District. Feb. 13.

**Tug For Sale.**

The well known harbor tug B. W. Aldrich, with two 16 square cylinders and ample boiler capacity. She cleared over \$3,000 last season. Reason for selling: Owners transferring their lumbering operations to Pacific coast. Pelton & Reid, Cheboygan, Mich. tf

**"Seaboard Steel Castings."**

MANUFACTURERS OF  
"THE ADMIRAL" ANCHOR.

THE LATEST AND BEST  
STOCKLESS ANCHOR.

APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON  
ORDER, OR STOCK ORDERS  
PROMPTLY FILLED.

A GUARANTEE OF QUALITY.

OPEN-HEARTH STEEL CASTINGS  
OF THE HIGHEST GRADE.

FACILITIES FOR CASTINGS UP TO  
80,000 POUNDS WEIGHT.

MACHINE WORK AND PATTERNS  
FURNISHED WHEN REQUIRED.

RAIL OR WATER DELIVERIES.

CAPACITY, 1500 TONS PER MONTH

**Seaboard Steel Casting Co.,**

CHESTER, PA.



"BENEDICT-NICKEL" Seamless Condenser Tubes  
are the only ones that resist electrolysis.

Far superior to brass or copper.

Our treatise on "Electrolysis of Condenser Tubes"  
tells why—send for it.

BENEDICT & BURNHAM MFG. CO.

Mills and Main Office, Waterbury, Conn.  
New York, 253 Broadway. Boston, 172 High St.



# BELLEVILLE GENERATORS

Grand Prix 1889  
Originated 1849

Hors Concours 1900  
Latest Improvements 1896

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895.....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900.....	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
Total.....	757,503	713,637	644,784	597,423	387,519	356,376	292,683	209,514	172,182	128,730	85,950	52,140

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.

WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS · BELLEVILLE, SAINT-DENIS-SUR-SEINE.